





62397/3

MEDICAL SOCIETY
OF LONDON



ACCESSION NUMBER

PRESS MARK

EARLE, Sir J.

LD 3
PRACTICAL OBSERVATIONS

ON THE

OPERATION

FOR

THE STONE.

SECOND EDITION.

WITH

AN APPENDIX,

CONTAINING

A DESCRIPTION OF AN INSTRUMENT CALCULATED
TO IMPROVE THAT OPERATION.

BY SIR JAMES EARLE, F. R. S.

Surgeon Extraordinary to the King, and to his Majesty's Household; and
Senior Surgeon to St. Bartholomew's Hospital.

LONDON:

Printed by W. Flint, Old Bailey;

And sold by J. JOHNSON, St. Paul's Church-yard.

1803

TO
MR. WILLIAM LONG, F. A. S.

AND SURGEON TO ST. BARTHOLOMEW'S HOSPITAL.

DEAR SIR,

I BEG your acceptance of the following Treatise; and give me leave to say that I feel great satisfaction in presenting it to you, as to an old friend, who has long laboured with me in an establishment which reflects the highest credit on its beneficent supporters, and does honour to humanity; as to a perfect judge of the subject of the work, and as a witness of the facts which it contains.

I am,

Dear SIR, with great regard,

Your most obedient humble servant,

Hanover Square,
Feb. 25, 1793.

JAMES EARLE.

P R E F A C E.

THE subsequent observations wholly originated and were written in consequence of a passage inserted by the late ingenious Doctor Austin, in his Treatise on Human Calculi, which had, in the judgment of many professional men, a tendency to create too much alarm in the minds of persons afflicted with a painful disease, and to depress their hopes of relief, by representing the only known means of curing it in an unfavourable light. An endeavour to soften such an impression, so far as a real statement of facts could produce that effect, appeared to me a duty to society. The papers were at the press when the melancholy event of the Doctor's death took place. I now there-

fore feel peculiar satisfaction in having shewn them to him in manuscript, and that they received the sanction of his approbation. Indeed it was his design, as he assured me, had he printed another edition of his work, to alter the expressions to which I have alluded. Such occasion not having been furnished, the observations which I have advanced in the following Treatise, appear to be more necessary, since the assertions on which it was designed to comment cannot be retracted by the authority from which they came, but must continue unrepealed to produce their influence, as unfortunately their author is no more.

The loss of this eminent man must be severely felt, and will be long lamented by his family, by his numerous friends, and by the world.—As I conceive that some particulars of a life so conspicuously useful may be gratifying to many who were only personally acquainted with him, and perhaps not uninteresting

teresting to others, I am induced to embrace the opportunity, which the mention of his name at this time seems to offer, of paying a feeble tribute to his memory ; and I hope that the call of friendship, and the desire of contributing to preserve the record of an exemplary character, will be permitted to plead my excuse if, *in this place*, I take the liberty of inserting the following narrative,—for the materials of which I have the best authority.

Doctor William Austin was born at Wotton-Underedge, in Gloucestershire, the 28th of December 1754. He was the youngest of eight children. His father was a clothier, which trade had been followed by his ancestors for several generations : at eight or nine years of age he was sent to the grammar-school of that town, under the tuition of the Rev. Mr. Cliffold ; he continued there until he was about thirteen, and had at that time made a

considerable progress in Latin and Greek. Being designed for trade, he was then sent to a school at Stroud in the same county, to learn writing and accounts, where he continued about a year; at the expiration of which time he returned home, and remained with his father about two years, being occasionally employed in such concerns as might more immediately become the object of his future pursuits. During this time his friends were endeavouring to procure a situation for him in the counting-house of some reputable merchant in London; but that intention being frustrated, and the early suggestions of genius prompting, determined him to return to the grammar-school, and qualify himself for the University. His friends, apprehensive that this determination might be eventually injurious to his interests, recommended to him deliberately to reflect on the steps which he was about to take,

take, but understood that his resolution was maturely and steadily formed, and were desired only to request that he might be placed as forward as possible by his master, in order to have an opportunity of regaining the time which he represented himself to have lost. But no time really seemed to have been misapplied, for even while he continued with his father he had amused himself with reading many Latin and Greek authors; so that when he returned to school, Mr. Cliffold, who expected, as his pursuits had been different, that he must of course have forgotten much of what he had previously learned from him, was much surprised to find that he was greatly improved, being able to read Thucydides, and other difficult authors. From such rapid improvement one might have supposed him almost to have been absorbed in study, yet we find him not only fond of reading, but at this

time enjoying society and every juvenile amusement : from an early age he excelled in every sportive game, and from an eagerness, which accompanied all his future pursuits, often slept in his clothes, to save the time of dressing, that he might be more ready to resume his play. Though apparently not of a robust make, he was naturally very muscular, strong, and remarkably active; at a more advanced period he frequently walked from London to Oxford, above fifty miles in one day, and from Wotton-Underedge to Oxford, about an equal distance, in the same time, and returned in the same way. Once going from Oxford, and endeavouring, as the road was dirty, to find his way over the fields, he was benighted within ten miles of his father's house, when hearing some people dancing in a barn, he joined in the dance, and got home early the next morning, appearing not in the least tired. He used to say

say that after he had walked 28 or 30 miles, the journey ceased to be pleasant, though not very fatiguing.

I cannot forbear relating another circumstance of little moment, but as it serves to pourtray his activity and perseverance. Being at the house of a friend one evening, where they were regretting, as the weather was fine, that they could not procure a man to cut down about an acre of heavy grass, he suddenly exclaimed, I'll do it.—They smiled at his manner and design, thinking it far beyond his strength and ability, when he again said, I will do it tomorrow.—He began accordingly early in the morning, and got through it very well in one day—a very sufficient task for a person in the habit of mowing.

Great bodily exercise he always thought necessary for his health. Indeed he scarcely had

suffered the illness of a day until he was settled in London, where the almost constant confinement to a carriage tended to undermine his strength and constitution.—Caveant Medici! a professional chariot often contributes more to the health of others than to that of its owner.

He was admitted a Commoner of Wadham College, Feb. 20, 1773. As his own inclination alone had led him to the University, and as he knew that he could receive but little assistance from his father, he determined to qualify himself for any thing which might possibly be obtained in College. Thinking himself still deficient in the Greek language, he exerted his utmost application to attain an exact knowledge of it. And, some time afterwards finding there was an exhibition for a student in Hebrew, he determined to learn that language. As it was near the vacation, his tutor recommended to him to stay in college

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lege and apply closely to it ; but not choosing that confinement, he went to visit his friends. On his return to college, his tutor rather upbraiding him with the loss of time, as the exhibition was soon to be filled up, the Doctor assured him that he had studied Hebrew—and was ready to submit to an examination.—It appeared that he had spent his vacation with the most industrious attention to the subject.—He became a candidate for the exhibition, and obtained it. He was elected a scholar of Wadham in 1773.

When he went to the University it was his original intention to take orders, a profession in which he might gratify his taste for a college life. And it is probable that he took some pains to qualify himself for the church, from the facility with which he afterwards wrote sermons for several of his young clerical friends, many of which, some in print and some in manuscript,

script, are in considerable estimation. Dr. Austin lately informed a friend of mine, that he thought himself highly honoured, on being told last winter by a dignitary of the church, of distinguished abilities, that he had just preached a sermon of the Doctor's composition. As other prospects opened equally favourable to his wishes, he relinquished his first design, and soon afterwards declared a determination not to take orders, though he did not appear at that time to have decided in favour of any other profession. He shewed a disposition to practise either physic or law, but seems not to have made his election between the two till he had obtained a botanical exhibition, which having a connection with medicine, probably determined him in the choice, from which he never afterwards deviated.—November 9, 1776, he took his degree of Bachelor of Arts, and soon afterwards

wards became assistant-tutor to the celebrated Dr. White, the Laudian Professor of Arabic, and on the professor's declining to take pupils gave lectures on his own account.

Hitherto his literary pursuits had been various and equally applied to the elegant and profound parts of science. The study of medicine now began to predominate; and in order to improve his knowledge in that science by the most extensive means of practical observation, in 1779 he came to London, and entered as a pupil at St. Bartholomew's Hospital. During his residence in the metropolis he paid the strictest attention to the study of diseases, to anatomy, and to every species of information which could adorn the philosopher, or accomplish the physician. To mark his assiduity and general thirst after knowledge, it may be mentioned that he regularly attended Mr. Pott's surgical lectures, though upon
subjects

subjects not absolutely necessary in the line of practice which he intended to pursue. Possibly he might agree with what Mr. Pott often remarked, “that both branches of medicine are so connected together that they are not to be separated without doing great injury to both, and that to understand the theory of surgery would be something more than a feather in the cap of a regular physician.”—His character did not escape the observation of so experienced a judge of men and manners as Mr. Pott, who often observed to me, “I shall not live long enough, but you will see Austin at the head of his profession.”

After he had thus diligently pursued his studies for a time in London, he returned to Oxford, when relying on his own industry, he generously relinquished the whole of his patrimony, which was small, for the benefit of his sisters, and on the sole but solid basis of his abilities,

abilities, commenced *faber fortunæ suæ*. In Act Term 1780, he took the degree of Master of Arts, and in the following year he published an examination of the first six books of Euclid's Elements. The study of the mathematics had always great attractions for him, and, it is probable, had he possessed an independent fortune, he would have applied more closely to it: about this time he gave public lectures in that science in the absence of the Savilian Professor of Geometry, which he also continued to do after he had begun to practise as a physician. He was admitted to the degree of Bachelor of Physic in Lent Term 1782, and to that of Doctor in the Lent Term of the following year. He was enabled to take this degree so soon after the former in consequence of a statute made in the latter end of the year 1781, by which the time required for medical degrees was greatly shortened.

In 1782, he married Elizabeth daughter of

John Dupre, Esq. She died in 1784, and left one son, who survived her but a few days.

In 1784, though variously engaged, not finding his time completely occupied, it was his intention to give a course of Lectures on Physiology to the medical students of the University, and he applied himself with his usual alacrity and vigour of mind in collecting and arranging materials for this purpose; but before he had perfected his plan the Professorship of Chemistry became vacant, and to that office he was appointed in 1785. At this time his character stood very high in the University; and though the science of chemistry was in a manner new to him, yet great things were expected from a man of his acknowledged abilities and indefatigable application, so that when he began his course he was attended by a very numerous and respectable audience. It is but justice to say that he acquitted himself
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with great credit, to the satisfaction of the University, to the advantage of the pupils, and to the improvement of the science itself.

In 1786, he married Miss Margaret Alan-son, his present widow, by whom he had four children.

Though the study of chemistry occupied a considerable part of his time, the principal point which he had in view was the practice of physic, and to this all his other studies happily tended: but above all, the accurate acquaintance with the animal œconomy which he had gained during his physiological pursuits, contributed to that clear discrimination of diseases, and that quick perception of the various deviations from the natural functions which in his future practice he uniformly evinced. His industry and abilities procured him employment in his professional capacity at an early age; and he continued to practise at Oxford with great and increasing reputation until

1786, when, being invited by the general voice of the governors to accept the office of physician to St. Bartholomew's Hospital, he came to London.

His conduct in his new situation accorded with the general tenour of his life. Humane and assiduous care of the patients, the most polite attention to the instruction of the students, and an ardent curiosity to see and investigate every uncommon occurrence which could either throw new light on any disease, or enlarge his own sphere of knowledge, marked his progress.

His time was not yet so much employed as to prevent him from giving up a portion of it to his favourite pursuit of chemistry. Like his great predecessor Boerhaave, he found amusement for his leisure hours in making chemical experiments, of some of which he has left an account, particularly of his experiments on the formation of volatile alkali, and

of the affinities of the phlogisticated and light inflammable airs. A memoir on this subject he presented to the Royal Society in 1787, and another paper containing his experiments on heavy inflammable air, in 1789, both of which were inserted in the philosophical transactions.

Soon after he became physician to St. Bartholomew's Hospital, he instituted a course of lectures on chemistry, and on the theory and practice of physic, for the benefit of the pupils; which he afterwards gave in a convenient building provided for him by the liberality of the governors of that charity.

His last experiments on chemistry were principally employed in analyzing and investigating the nature of concretions formed in animal bodies, particularly those which are found in the urinary bladder. In the prosecution of this, he employed much time, often taken from the natural hours of repose, and he bestowed uncommon pains on the subject
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with a view to find some internal means of relieving mankind from so cruel a malady. The result of these enquiries made the subject of his Gufstonian lectures which he read at the College of Physicians in 1791, and were afterwards formed by him into a treatise.

The qualifications natural and acquired, which Doctor Austin possessed, could not fail of attracting the notice and commanding the respect of the world. His comprehensive knowledge, his patient attention, acute discernment, and extraordinary activity, soon led him into an extensive circle of professional employment, while an engaging mildness of manners made all his patients his friends.

His reputation, rapidly increasing, found in this great city and its environs ample room for its expansion. In 1790 his time became so much occupied, that he was obliged reluctantly to relinquish his lectures at the hospital: this however he did with the less regret, from
a certainty

a certainty of their being ably continued by his much valued and learned friend Dr. Latham. On the further increase of business, finding that the multiplicity of his engagements would not permit him conscientiously to attend to his duty at the hospital, he determined to resign it, and had actually given notice of his resignation before his last illness.

If the shortness of the time in which Dr. Austin exercised his profession in London be considered with the extent of his practice, the rapidity of his progress has perhaps been unparalleled, certainly not exceeded. Had it happily been more moderate, or, while engaged in preserving the lives of others, had he not been inattentive to his own, we should not, in all human probability, now deplore the loss of him, but like a Heberden, or a Cadogan, he might have long continued an ornament to his country, and a blessing to mankind.—It appears that excessive attention

to the duties of his profession, too short a time allowed for the necessary refreshment of sleep, and too little regard to the actual state of his health, brought on the fever which put a period to his distinguished life, at the premature age of thirty-eight, on the 21st of January, 1793.

PRACTICAL OBSERVATIONS

ON THE

OPERATION FOR THE STONE.

THE particles of matter which form the animal fluids quitting the mode of combination in which they usually exist, may undergo a new arrangement, and form masses of considerable solidity. While the fluids are, in the course of circulation, agitated by constant motion, and endued with the principle of life, any disunion of their elements seems scarcely possible; but the secreted fluids which stagnate in the excretory ducts, or reservoirs

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belonging

belonging to glands, and which in consequence of such stagnation may probably be deprived of a portion of their vitality, are more subject to chemical decomposition. Under such circumstances, and in such situations, these solid concretions are most frequently formed. They are found in the lachrymal sac, the ducts of the sublingual glands, the gall bladder, the kidneys, ureters, urinary bladder, and urethra; and, though not so hard nor so heavy as those commonly produced in the earth, have, from superficial observation, been usually denominated stones.

Concretions of various kinds are formed in many other parts of the body; they are sometimes thrown out on the surface of membranes, as on the pleura; they are sometimes collected in the ramifications of the bronchial vessels of the lungs, whence they have been discharged by coughing. Incrustations have been found under the pre-

puce of infants, and in the joints of gouty people matter resembling chalk is often abundant. The brain is not exempt from substances of this nature, the pineal gland frequently containing fabulous matter, and in one instance, probably not the only one, the gland was converted into a mere cyst filled with sand.

When stones are formed in parts without motion, they sometimes cause no pain nor inconvenience. In the ducts of the sublingual glands there have been instances of their increase to a large size, without producing sufficient sensation to be noticed till they have burst their way through the integuments, and they are sometimes met with in tumours and abscesses where there had been no suspicion of them. In the case of the hernia of the urinary bladder, mentioned by Mr. Pott, which included a stone, the portion of the bladder which contained it, being without

motion, suffered no pain ; the person felt no symptom of the stone, and was only conscious of a lump or swelling in the groin. Yet it is also certain that they often give great pain by the distension of the sensible parts which contain them, particularly in the kidneys and gall-bladder.

As the urinary bladder is the most capacious cavity in the body, where the greatest quantity of fluid is gradually collected, and long retained, it must follow that it is more liable, than any other part, to this disease ; indeed the urine in this situation seems so much concerned in the formation of these concretes, that any foreign body, of whatever kind, which accidentally may be deposited in it, will there infallibly attract and collect solid particles, even in persons who are not constitutionally subject to the stone, nor have ever been affected with any disease of the bladder. When stones are formed in the cavity of this organ, the motions

tions and contractions to which it is subject, cause them to produce the most exquisitely painful sensations.

The stone in the urinary bladder will be the object of our present consideration, being one of the most severe diseases which afflict the human frame, and demanding, in a peculiar manner, the assistance of surgery. It is a disease to which both sexes and all ages are liable; stones are often found in the bladders of very young children*; sometimes they do not begin to accrete till a more advanced age; in other persons no symptom of them is perceived till the inactive decline of life.

When, from whatever cause, a nucleus or centre of attraction is once formed in the bladder, the solid matter which is attracted and takes place round it, is deposited in la-

* I have lately seen an infant who, when six months old, and at the breast, which was its only nourishment, voided with pain large quantities of gravel.

minæ of different thickneſſes. Some ſtones are of a reddiſh brown colour, others are aſh-coloured, others white, and ſome of a dark colour reſembling iron ore; theſe laſt mentioned are very uncommon. Some ſtones are cloſe, compact, and hard; others are of a texture ſoft as chalk. Sometimes the different laminæ, in the ſame ſtone, differ from each other in texture, colour, and conſiſtence. It has been remarked that ſoft ſtones grow faſter than hard, and are often angular; hard ones are uſually oblong or oval, very ſeldom round. Hard ſtones, with a ſmooth ſurface, ſometimes do not excite great pain; when angular or rough, the contractions of the bladder on them cauſe exquisite pain and irritation, particularly on the expulſion of the laſt drops of urine. Small ſtones of this deſcription falling into and lodging in the neck of the bladder, are more painful than when they are grown ſo large as to continue in the
cavity

cavity of the bladder, where the pressure on them is not so violent.

Women are less subject to this complaint than men; whether their constitutions are less liable to calculous depositions remains to be proved, but whenever they are collected in the female bladder, they are much more likely to be evacuated than in men, because, in them, the neck of the bladder, not being surrounded and embraced by the prostate gland, and the canal of the urethra being straiter, shorter, and more easily admitting considerable dilatation, a stone will readily pass through of such size as could not be discharged by the male urethra. So that in females it is rare to meet with a stone in the bladder.

In children the stone seems generally to be formed in the bladder, as they seldom complain of pain in the kidneys, but in adults it frequently originates in the kidneys, and from thence is washed by the urine into the blad-

der. This can scarcely be effected without the person feeling pain, and a consciousness of having passed a stone; in which case he should drink plentifully of diluting liquors, and retain his urine till the bladder is so distended as to create a great desire to evacuate it; he should then place himself on his knees, bend his body forward, and make water in that situation, the little stone by its weight will fall into the neck of the bladder, and very probably may be carried away with the urine copiously rushing out. I am persuaded if persons subject to calculous concretions were attentive to such directions, we should see fewer cases of stones in the bladder. In either sex if the first deposit be not speedily removed, it forms, as was observed, a center of attraction to similar particles, becomes too large to pass through the urethra, and, sooner or latter, according to the nature of the stone, acquires considerable magnitude.

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The calculi of the human bladder have lately been investigated by a physician of great eminence, and of distinguished knowledge in the science of chemistry. A treatise which he has published contains many ingenious experiments on the cause and formation of stones. It is much to be wished that these enquiries may be prosecuted, and that a more general attention may be excited to a subject hitherto too much neglected. The gaining a true knowledge of the cause is the first rational step toward the cure of diseases; such investigations therefore are most likely to effect a discovery of the long-sought solvent of the stone, or of the prevention of its growth. At present, as it is observed in the treatise before mentioned, “ the art of dissolving the
 “ stone, in such manner as to assist those who
 “ linger under it, is yet imperfect.”

Till so valuable a disclosure of the powers of nature is produced, the operation of Lithotomy

tomy appears to be the only means by which the wretched sufferers can procure effectual relief. This, at the close of the same work, is acknowledged; but is accompanied with the following observations. “ In the present
 “ state of medicine, those who suffer this spe-
 “ cies of disorder, must either bear it for life,
 “ or submit to an operation which few sur-
 “ geons ever acquire the art of performing
 “ dexterously, and which, performed even
 “ by the most skilful, is by far the most dan-
 “ gerous of any that is practised in surgery.”

To cure with the least possible pain or inconvenience humanity points to as the great object of every branch of the medical art. The first study of the surgeon should be to prevent, by all safe means, the necessity of operations, as it is his duty properly to qualify himself for the performance of them, when indispensable. It must be admitted that there are few so difficult as Lithotomy, and
 that,

that, unscientifically executed, it may be very dangerous, but I trust there are many of our profession capable of “ performing it “ dexterously.” And when skilfully performed, the almost certain success attending it is the best proof that it is not so dangerous as the author has represented it to be. This I shall endeavour to demonstrate in the sequel of these observations.

I am too well acquainted with the humane motives which influence my learned and ingenious friend to think any apology wanting for the freedom I have used with his opinions, but I must observe, that the respect which the world very justly pays to his abilities, giving proportionate weight to what falls from his pen, has made it absolutely necessary to take notice of so discouraging an assertion. And I am confident, that if I am able to substantiate what I have advanced, he will be happy to find that he has been mistaken, and that

mankind

mankind stand a better chance of being safely relieved from this painful disease than he has imagined.

Conceiving it important that the operation of lithotomy should be shewn in its proper point of view, I have been led to reflect on the *modus operandi*, and on the probable causes which promote or prevent its success. These reflections have induced me to undertake to give some account of the operation itself, to describe what appears to me to be the best method of performing it, and to point out such circumstances as are materially conducive to its happy termination. I am well aware that this subject has been already considered by several writers with great precision and judgment, and I have not the confidence to imagine that I can greatly improve on their descriptions; yet, he must be a very inattentive observer, who, after having seen much of practice, cannot add something

thing to the stock of general experience. On considering what has been premised by others, I am inclined to think that some principles concerning it may be brought forward, which perhaps have not been sufficiently enforced, attended with some incidental occurrences, which, though apparently minute, are very essential to the safe performance of it.

The principal observations which I shall make will, in a great degree, be applicable to every operation of lithotomy, and the whole will be comprised within a small compass, as I do not think it necessary to enter into a detail of all the different methods which have been employed, nor into a description of the ingenious instruments contrived for their completion; but, leaving them to their respective inventors and patrons, shall chiefly confine myself to those instruments which I have invariably used, and to that method which I have employed
with

with such success, as warrants my supposing it at least equal to any other. However, before we enter into the consideration of it, some account of the indications which lead to a suspicion of the existence of the disease will be properly preparative.

Writers on the subject of stone in the bladder have frequently laid down certain symptoms as unequivocal indications of the complaint, but they are not precisely so, as they cannot be distinctly or determinately defined. The principal symptoms which they mention are—great pain in voiding the urine—difficulty of retaining it, and frequently of preventing the fæces from being discharged at the same time.—When the urine flowing *pleno rivo*, is stopped at once, but on changing the posture, flows again.—A dull pain about the neck of the bladder, frequently accompanied with an acute pain in the glans penis.—A sense of weight or pressure on the
empty

empty rectum, or after a stool, when, usually, it is at ease.—A large quantity of mucus mixed with the urine, and sometimes tinged with blood.—

Such symptoms, at different times, certainly accompany a stone in the bladder; but they may also be produced by other diseases to which the bladder and its appendages are subject. If we consider the connexions of the neck of the bladder, we shall see that an affection of any of the neighbouring parts must produce the same effects. Pain in making water, and not being able to discharge the urine without the fæces, are common consequences of irritation of the parts about the neck of the bladder, from a diseased prostate gland, and from other causes. The urine stopping in full stream is frequently caused by a stone altering its situation so as to obstruct the passage; but the same thing may happen from a tumour or fungus in the bladder.

der. I have seen an instance of this where a tumour hanging by a small pedicle would sometimes cause obstruction, and by altering the posture, would retire and give a free passage.—The dull pain at the neck of the bladder, and the sensation of pressure on the rectum are frequently owing to the weight of a stone being greater than that of the fluid which they are naturally appointed to bear, but these may proceed from a diseased enlargement of the prostate gland.—Children generally, and grown persons frequently, are subject to a prolapsus ani from the irritation of a stone in the bladder, but it will likewise be produced by any irritation in those parts; a cancer or painful fungus in the rectum will bring it on.—A large secretion of mucus, it is true, is a frequent attendant on calculous complaints, and is produced by the irritation of the stone on the tender coat of the bladder: it is intended by nature as a preservative, and

were

were there no such secretion, the bladder would have no defence against the stone, nor would any one be able to support the contact; however this appearance is by no means a certain indication of the existence of a stone, as it may be produced by any cause capable of generating the other symptoms. Besides the irritating causes which have been mentioned as augmentative of mucus, a defluxion on the hæmorrhoidal vessels will sometimes have the same effect. And I have known a patient afflicted with this and other symptoms of the stone, which after death appeared to have arisen from no other cause than a scirrhus enlargement of the os tincæ. Even those who have any distemper in the kidneys will appear to have a stone in the bladder, and will be subject to the same pain, irritation, and secretion. I remember particularly the case of a lady, who laboured under continual pain, and discharged a quantity of offensive

mucus in her urine; it was concluded by her physicians that she had a stone in the bladder; on being searched, none was found. It was then thought to be owing to ulcerations of the bladder, as her symptoms exactly imitated a disease of that viscus, and for this she took a variety of medicines. She was with child, and, soon after she was brought to bed, she died. On examination the bladder was found perfect in every respect, but both kidneys were much diseased, and one contained a large ragged stone. This probably had furnished the large discharge of mucus, and by the connexion of parts, had produced the pain which she described to be in the bladder. So equivocal are what, have been called symptoms of the stone, and from such various causes do they arise.

The least fallible sign, which I have remarked, of a stone in the bladder, is the patient making the first portion of urine with ease,

ease, and complaining of great pain coming on when the last drops are expelled. This may readily be accounted for from the bladder being at first defended from contact with the stone by the urine, and at last being pressed naked against it. But to put the matter out of all doubt, and actually to prove the existence of a stone in the bladder, we must have recourse to the operation of founding.

In order to make this treatise, what I hope it may prove, really useful, it is my intention to go minutely through every part of the operation of lithotomy; in doing this, I may seem to dwell on some circumstances which may not to every one appear of sufficient consequence to be noticed; but, as I shall mention only what I know to be material, I would rather, on a subject of such importance, incur the charge of prolixity, than omit any incident, which may conduce to success.

A perfect and just knowledge of the parts

C 2 concerned,

concerned, is necessary to the right performance of every operation in surgery; in lithotomy it is peculiarly requisite, where the hand cannot be guided by the eye, but must be wholly directed by anatomical knowledge. The first objects therefore which the lithotomist should attend to, are the structure of the urethra and bladder, and their true disposition with regard to the adjacent parts; some account of these it will not be unuseful to premise.

Anatomy is best learned by ocular investigation, and is so completely taught in the several schools of this metropolis, that I should not think it necessary to enter on the subject in this place, but with the idea that a description of the parts concerned may serve to refresh the memory of any one about to perform the operation, and to render more intelligible my account of it. In this I shall not attempt the minute demonstration of an anatomist,

tomist, meaning only to point out the principal circumstances which require the attention of the surgeon.

The operator ought not only to be acquainted with the situation of the parts as they are usually exposed and demonstrated in dissections, but he ought to apply particular attention to their relative situation when the pelvis is placed in the usual position during the performance of lithotomy, and to the successive order in which those parts are exposed and divided by his instruments.

In order to impress these circumstances more forcibly on his mind, I would recommend him, previously to the operation, to ascertain on the pelvis of the patient the situation of the arch of the pubes, and then to trace the diverging rami of that bone, and of the ischia, to their tuberosities, for these bony boundaries are the parts from which his future observations must be taken.

The raphé of the perinæum divides the space between these bones into two equal parts. Immediately beneath the raphé, and before the arch of the pubes, is situated the urethra, which at that part being surrounded by a larger quantity of cavernous substance forms its bulb, some portion of this substance being detached from the canal of the urethra, hangs slightly pendulous *before the arch of the pubes*. The membranous part of the canal is a continuation of the urethra from the bulb to the entrance of the prostate gland. It is in length about three quarters of an inch, and passes *beneath the arch of the pubes* unfurrounded by any thing but cellular substance. The membranous part of the urethra is not however in contact with the bone, but lies about three quarters of an inch beneath the arch, being connected to it by intervening cellular substance.

The prostate gland which surrounds the
urethra,

urethra, as it emerges from the bladder, is situated *immediately behind the arch of the pubes.*

The urethra thus variously furrounded, forms a segment of a circle which is exhibited by the ordinary curvature of the staff. The whole canal is furnished with mucus from many small glands, and as the orifices open outward, there is greater resistance to any thing passing from without inward, than from within outward.

The bladder is, speaking in general terms, composed of an internal membranous coat, covered by muscular fibres. The peritonæum is spread over the superior and posterior part of the bladder, but its anterior and inferior part is without this covering. The figure of the human bladder is not pyriform like that of brutes, but is of equal dimensions at both extremities. A line drawn from the fundus in its longest axis, will not pass through the

neck, but through the middle of its inferior part, and will go out of the pelvis between the tuberosities of the ischia, nearly at the extremity of the os coccygis.

The termination of the rectum is at a small distance from the membranous part of the urethra. When the rectum is *undistended*, it proceeds, for some way in the pelvis, in a situation rather inferior to the anus, therefore sufficiently remote from the probability of receiving injury in the operation.

I have thus given an outline of the principal parts concerned. They lie imbedded in a large quantity of cellular and adipose substance, and are covered by strata of muscles and integuments. The extremity of the rectum is enclosed by an elliptical sphincter. The bulb and cavernous substance of the urethra, by the acceleratores urinæ. As neither of these demand particular chirurgical attention, they do not in this place require description.

The

The transversi perinæi deserve more particular notice, as they must necessarily be divided in the operation. These muscles arise from the tuberosities of either ischium, and extend transversely across the perinæum, partly mixing with the acceleratores urinæ, partly with the sphincter ani, and partly terminating in an obscure and undescribable manner between the bulb of the urethra and extremity of the rectum.

Passing the sound even in a healthy subject, is an operation which requires both dexterity and delicacy ; but if we consider that in persons afflicted with the stone the parts are frequently inflamed, painful, and diseased, it becomes infinitely more difficult, and demands the utmost degree of patience and care, it may otherwise produce great present pain and much future inconvenience. The instrument which is usually employed is solid and made of steel ; the figure of it differs with regard to
the

the greater or smaller convexity of the curve. In the operation of lithotomy it may be right to have the staff made with considerable convexity, that it may be more easily felt and cut upon; but for the mere purpose of searching, one with a smaller convexity, or more inclining to a strait line, will pass more readily and answer better. The catheter has been said to serve the purpose of searching as well as the sound, and though the touch of the iron instrument, when in contact with the stone, is more clear and precise than the hollow silver, I am inclined to think the catheter is in some respects preferable; if the bladder contains water, the entrance of the catheter is clearly shown by the water coming through the canula, and as it flows away the bladder contracts and brings the stone into contact with the instrument, for which reason it is better for the patient to retain his urine before he is searched. If the

bladder

bladder has been recently emptied, a small stone may lie in the folds so as not to be readily felt, and may make the operation, which in itself to most people is irksome and painful, more tedious than it needs to be. If the patient could bear to have the instrument introduced standing, it would be an advantageous position, or, supposing it passed in the usual way, as half-sitting half-lying, he rests on the os sacrum, he may afterward be made to sit up while the water is flowing, and the stone by its gravity will fall toward the neck of the bladder, and come into contact with the catheter.

Whether a sound or catheter be used, it should be proportioned to the size of the patient, and the thickness should be determined by the diameter of the urethra. In general, an instrument of rather large size passes better and safer than a small one, as it stretches the urethra before it, and makes a little space for
its

its own passage, whereas a small one is more apt to hitch in the folds of the membrane which lines the urethra.

The instrument, being well oiled, may be introduced in men with the handle toward the belly, in which case it is only necessary to pursue the course of the urethra with the point of it. The usual and most convenient way is to introduce it with the handle toward the knees, till it reaches the part of the urethra where it begins to make a curve in order to pass under the ossa pubis; the handle is then to be gently turned and to be brought up to the center of the abdomen, care being taken not to lose any ground with the point. The best method to make the instrument pass, is to take care that the hand which has the instrument, and that which holds the penis, act in concert, the left hand stretching the urethra and rather drawing that over the instrument, than forcing on the instrument itself; by these means

means it will usually pass with ease till it arrives in the membranous part of the urethra, and near to the neck of the bladder. At this part, from the pressure of the prostate gland, which is often enlarged by inflammation, caused by irritation from the stone; or possibly sometimes by the instrument carrying the membrane which lines the urethra before it, and behind the prostate, the completion of its introduction into the bladder is obstructed. When such a hindrance or impediment occurs, it requires great delicacy and management. If the instrument be pressed on it is very liable, particularly in a young subject, to make its way through the membranous part of the urethra, which is the thinnest and weakest part of the canal; and thus a false route may be established—a circumstance very injurious in itself, and likely to lead to the most dangerous consequences in case of a subsequent operation for the stone, as the staff

would

would most probably enter the new made passage, and the gorget necessarily following the direction of the staff would not be conducted into the bladder. This circumstance, I fear, has too often happened, and led to a fatal error. I once searched a boy, on whom the staff passed with the greatest ease, and found a stone in the bladder ; it was determined for him to undergo the operation of lithotomy, and the day was fixed when I was to perform it ; in the mean time he was searched by another person, who, as the boy said, had given him great pain, and some blood had followed when the instrument was taken out. On introducing the staff in order to perform the operation, it passed with tolerable ease, but when it was far enough to have reached into the bladder, I was surprised at not feeling the stone bare, as before, and the end of the staff did not seem to move freely, or be at liberty as if in an open cavity. On examining

mining per anum, I immediately discovered that the point of the staff had made its way through the membranous part of the urethra, and lay between the bladder and the rectum, and I was well convinced that it had followed a false route, which had been made by the second searching. I immediately withdrew the point of the instrument from the wrong passage, raised it and passed it into the bladder, where I directly found the stone, finished the operation, and the boy did extremely well, without a bad symptom. It is very possible that this accident might have been overlooked, and the wrong position of the staff not attended to, particularly as the weight of the stone made it palpably to be felt by the staff, though the coats of the bladder intervened, so that the want of naked contact was almost the only circumstance which pointed out the error, which, without a timely discovery, must have most probably led to the great detriment,

*May, account for cause of
 2. But...*

triment, if not destruction, of the patient ; and I wish I could say that this has been the only instance in which I have found a false route made by the awkward introduction of a sound or catheter.

If a difficulty or obstruction to the entrance of the instrument, when arrived at the neck of the bladder, should occur, as before observed, it should not be pressed on, but the point of the instrument being raised at the same time that it is a little withdrawn, it will generally find an easy way into the bladder. Or if it still does not pass readily, the finger introduced into the rectum to raise the end of the staff will generally give it the right direction.

In women the female catheter is more easily passed, as in them the urethra being nearly strait, it need be only introduced into the meatus urinarius, and passed gently on.

It is generally with much difficulty that
permission

permission is gained to search infants from the dread which parents have of it, and even grown up people dislike to be told disagreeable truths, for which reason, when the instrument is once introduced, we should not be in a hurry to withdraw it, but should take time enough to be thoroughly satisfied, which can only be done by moving the instrument in every direction. Sometimes, after having tried a considerable time, the stone will be perceived on withdrawing the staff; this happens when it is small and lies toward the os pubis. If the stone be large it will generally be felt immediately, and will give the sensation of a heavy steady resistance; if small, it will often elude our search for some time, and when felt will recede and give way; however, it cannot be supposed that the blind touch of an instrument, surrounded and embraced by the urethra and neck of the bladder, will always point out these circum-

stances with precision : on the contrary, we may often be deceived not only as to the shape and size of the stone, but it is sometimes difficult to determine whether what we feel be a stony concretion or not. The instrument passing over the rugæ of the bladder, particularly if covered with fabulous matter, will sometimes give a deceptive touch of a soft stone. I have known a case, in which too long a staff being used and pressed against the os pubis, gave the surgeon the idea of feeling a stone, when a shorter instrument being substituted, discovered the mistake. And I have heard of an operation being actually performed for a stone in the bladder, which, after death, proved to be an uncommon and diseased projection of the os sacrum, which pressed forward into the bladder, and gave to the staff the feel of a stone ; but I shall ever consider these as gross instances of too precipitate a determination, having no doubt but that great
attention

attention and repeated searching would have discovered the mistakes ; for it should be observed, that the introduction of the instrument once or twice is not always sufficient to discover a stone ; from the first fears of the patient, from awkward position, and from other causes, a small stone may elude our touch at first, which will scarcely escape being perceived, if a continuation of painful symptoms should induce the necessity of repeating our researches. I lately attended a gentleman a considerable time who had strong symptoms of the stone ; he was searched several times by myself and another surgeon, but the sound was always so strongly embraced by a spasmodic contraction of the neck of the bladder, that it could not be freely moved, and nothing was found. He afterward went into the warm bath, where, a great degree of relaxation being produced, I passed the catheter, and discovered a stone, which I afterwards extracted.

I may seem to have dwelt too long on this subject, but the operation of searching properly and judiciously is of such consequence, and frequently so difficult to be performed, that I think I could not have said less; and after every instruction that can be given, it requires practice; and every opportunity should be embraced to perform it on the dead subject previously to attempting it on the living.

When a stone has been felt in the bladder, and the patient, or, if an infant, his friends are convinced that there is no method of removing it but by extraction, provided there is no objection on account of the state of his health, or of the parts concerned, in general the sooner it is performed the better; as the longer the stone is permitted to remain, it must, by repeated irritation, continue to make the bladder in a worse state, and more unfit to bear any operation. Besides, all calculous concretions are increasing evils, constantly

stantly growing larger and becoming more difficult to extract.

There are, however, many circumstances to be taken into consideration before the operation ought to be resolved on. With regard to the season for operating, spring and autumn have been preferred, but I know of no time which it is necessary to avoid except the extreme heats of summer; in winter the regulation of warmth in the chamber is in our power. The health of the patient, and the state of the bladder, are considerations of more importance. If the patient be labouring under violent nephritic pains, the operation should be delayed, as he may be in the act of forcing a stone from one of the kidneys into the bladder. And it would be useless to remove what is already there, if another be likely to supply its place, and which, it is possible, the surgeon might be supposed to have left in the bladder.—Or if the patient be

affected with a violent paroxysm of stone in the bladder—that organ is probably at such a time in more than an ordinary state of irritation, and consequently unfit to bear the operation. Under such circumstances it is better to wait, though it be for many days, till by a horizontal position, with the hips raised to let the stone fall from the neck of the bladder, by the assistance of gentle laxatives to open the bowels, and by warm baths and opiate clysters, a relaxation from pain is procured. I have often remarked that the calculous patients who are admitted into the hospital, being brought in uneasy carriages, and from other causes, generally come in pain; this should be carefully attended to, nor should the operation of lithotomy be thought of till the irritation be subsided, and the bladder reduced to as cool and unirritated a state as possible.

If the patient feels great and continual pain

in the bladder, even when he does not want to empty it, and if it be tender and painful on applying the hand above the pubes, we must conclude that it has suffered by the stone, and is in a bad state. These circumstances may not be a total prohibition to the operation, but they induce an unfavourable prognostic of its success.

It is possible that the general constitution of the patient may be considerably impaired and injured by the continual pain arising from a stone in the bladder, and yet may not be a reason why the operation should be wholly abandoned; the cause being removed the effect may cease, as in these cases has been proved in many instances; but if the patient be in so weak and low a state as to be unable to bear the fatigue of the operation, it certainly should not be attempted, till by care and proper remedies his health be in some degree restored. To accomplish this

purpose, if the usual relaxing and anodyne plan fails, the milder lithontriptic medicines, such as lime water, may sometimes be advantageously given; though they may not be capable of entirely dissolving the stone, they may blunt the asperities, and soften the surface of it, so as to prevent it for a time from giving great pain, and thus, though perfect ease may not be procured, such a state of health may be obtained as may enable him to undergo the operation.

If the patient be in good health, and the operation determined on, a preparatory regimen for a few days should be observed; if he be inclined to be plethoric it may be necessary to bleed, and at proper intervals the bowels should be emptied by gentle means. His diet should be attended to, his food should be light and of easy digestion. If he be weak and low, it may be necessary to support him by nourishing diet and proper medicines.

We will now consider him in a quiet, and, speaking comparatively, easy state, and in every respect prepared to submit to Lithotomy.

The lateral operation is now usually performed, in this, and I believe almost universally in other countries, and as it is the method which I have invariably practised, this account will be confined to it. The origin and progressive improvements of this ingenious contrivance to take the stone from the bladder, have been so repeatedly described by writers, that it is not necessary to enter into a narrative of it in this place.

The instruments which are necessary for the performance of it are, a double edged bistouri, a grooved staff, a gorget with one cutting edge, forceps of different sizes, with scoops and other contrivances, which will be mentioned in their proper places.

Previous to the operation the perinæum
should

should be shaved, the rectum emptied by an enema, and an anodyne draught may be advantageously given half an hour before. The patient should be encouraged to drink barley water, or some diluting liquor, and not to empty the bladder for some hours before the operation, it being less exposed to injury from the instruments in a distended than in a collapsed state. This intention however is frequently frustrated by the irritation which a distention of the bladder produces in many calculous patients, obliging them incontinently to discharge its contents.

The patient being on his back on a table of convenient height, the body in a horizontal position, the shoulders and head rather elevated, and the legs hanging down; the staff should be introduced in the same manner as was described in the introduction of the sound or catheter, and the stone again be felt by the operator and a consultant surgeon,

geon *, the knees of the patient are then to be drawn up, and he is to be put in the proper position in which he is to be confined; being made to take hold of the bottoms of his feet, his hands are separately and securely to be attached to them by ligatures. While this is doing by the assistants the operator should not quit the staff, which is too frequently done, as by the alteration of position it may be forced out of the bladder. Or, if, on account of the inexpertness of the assistants he should think it necessary himself to attend to fastening the ligatures, knowing how essential it is to prevent them from giving way, or, if from

* The form of the staff is different according to the opinion of different practitioners; some prefer a bold curve, thinking it to be more plainly felt in perinæo. In large, and fat patients, a considerable degree of convexity appears to me to be advantageous. When it is to be used, it should be well oiled, but particular directions should be given that it be not greased above the sulcus; this may appear a trifling observation, but it really is not, as I have seen an operation embarrassed from the circumstance of the handle of the staff being slippery.

any

any other occurrence the staff has been neglected, it should again be examined, and the stone again felt, before the incision is begun. This point being ascertained, the staff is to be placed so as that the convex part shall be felt projecting in the perinæum, near the raphé on the left side, the handle inclined a little toward the right groin, should be steadily held by an assistant, exactly in the posture the operator has placed it in, and the scrotum must be kept out of the way by another. The operator then, being seated in a chair of convenient height, and feeling the projecting part of the staff, should begin an incision a little above it near the raphé, and rather below the arch of the ossa pubis, which should be continued through the skin and external integuments to about an inch and an half below the curve of the staff, slanting down between the verge of the anus and the tuberosity of the ischium, and ending somewhat lower

lower than that process. This incision should be freely made and of sufficient length to allow for the introduction of instruments, and subsequent extraction of the stone; both which are liable to be much impeded and embarrassed by too small an external opening of the skin, which does not readily stretch or give way.

The skin and cellular membrane being thus divided, the subjacent muscles are exposed, and the staff is plainly to be felt through them, which the thickness of the parts altogether generally renders obscure. A second incision is then to be made through the muscles, in the direction of the staff; the groove of the staff should now be found, and it is of great importance that it be plainly felt by the finger before the incision through the urethra is attempted, that the nail of the fore finger of the left hand being pressed into it, may serve as a direction for the point of the knife, while the other fingers keep open the external wound.

For

For want of this precaution operators are sometimes exceedingly embarrassed in endeavouring to cut into the groove, as without this direction the point of the knife may go right or wrong, on either side of the staff as well as in the middle. This want of precision in making the division of the urethra often greatly prolongs the sufferings of the patient, and the repeated strokes of the knife leave a ragged uncertain wound, in which the beak of the gorget gets entangled; but as was observed, the nail of the index or forefinger being pressed into the sulcus proves an infallible guide; and if suffered to grow rather longer than usual it will be found an advantage.

Although the incisions through the skin and muscles are most easily accomplished from above downward, it is safer to make the division of the urethra from below upward, with the back of the knife toward

the rectum. And our aim should be to pierce the urethra near the prostate gland, then to carry the knife in the sulcus upward as far as the bulb, by which the membranous part of the urethra will be completely divided.

When the groove of the staff is felt satisfactorily and sufficiently bare, the beak of the gorget should be introduced, being directed into it by the same index, and too great care cannot be taken to ascertain that it is there safely lodged.

Much difficulty has sometimes arisen from the beak being put into the sulcus too high, that is, too near the scrotum, so as to press against the os pubis; and people, particularly young operators, being liable to be hurried when any thing intervenes in an operation contrary to their expectation, are apt to press with violence, and the gorget slipping off the staff, has sometimes been pushed on so as to pass between the bladder and rectum.

Another

Another embarrassment which the operator sometimes meets with, is from the stone being so engaged in the neck of the bladder as not to suffer the staff to pass in fairly, so as to guide the gorget into the bladder, and sometimes this is not discovered till the gorget is going to be introduced and is stopped at its entrance. In this case the best instructions I can give are, to be steadily attentive to maintain the beak in the fulcus, and to press both staff and gorget gently on, into the bladder, by which, if the stone does not adhere to the parts which surround it, it will probably be carried before them into that cavity. Among the various cases which come under our care, we must expect now and then to meet with unforeseen difficulties; however, no such occurring, the beak of the gorget being fixed in the staff, at about the most convex part of its curve, should be kept pressed against it with the right hand, as the left must now be employed in taking
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the handle of the staff from the assistant and holding it, by which means the resistance and pressure of one hand against the other is felt. The gorget is now to be pressed gently on, till it arrives at the lower part of the convexity of the staff, when the operator, well knowing and recollecting the sweep and curve of it, will lower the handle of the gorget, and thus with certainty, keeping the beak in the channel, will pursue the direction of the staff into the bladder. If it contain urine, it will immediately gush out on the introduction of the gorget; but though the opposite side of the bladder is certainly less liable to come into contact with the gorget in the full, than the empty state, the operator should be aware that when the water is at once let out by the wound, the bladder not having time to contract itself gradually, will fall into large wrinkles or folds, which may be liable to be laid hold of with the stone.

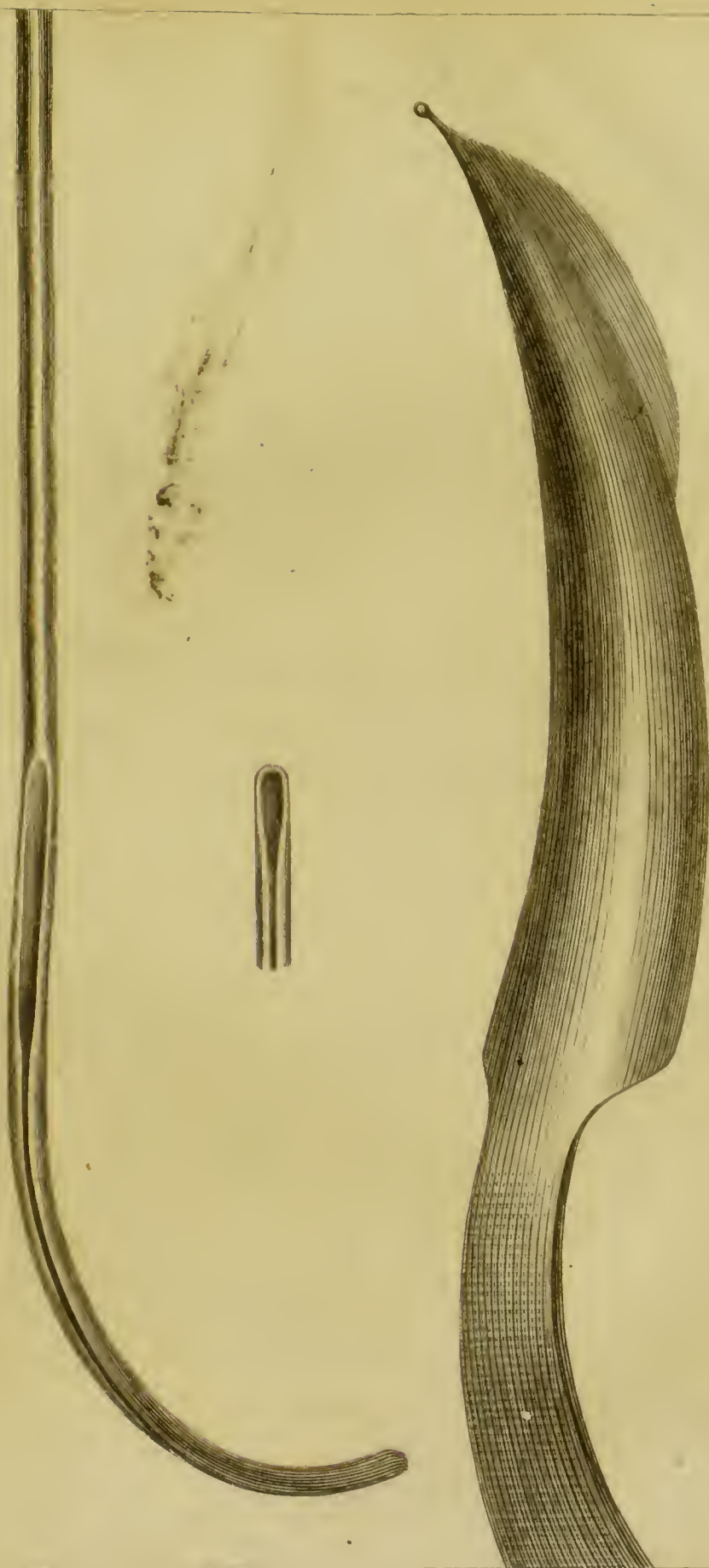
By the introduction of the gorget the neck of the bladder and one side of the prostate are sufficiently divided. Variety of methods have been invented to execute this part of the operation. I have always used the common cutting gorget, which answers the purpose extremely well, and if the shoulder, or cutting part, be made so broad as to make way for the blunt and more expanded part which is to follow, the principal objection to it appears to me to be obviated.

The introduction of the gorget is not easy to be described, and certainly is the most difficult and dangerous part of the operation, for, if by any means the beak slips out of the groove, the gorget must pass in a wrong direction, probably between the bladder and the rectum, the disappointment and ill consequences of which I need not enumerate. In short this is the rock on which so many practitioners have split, and to avoid the hazard
and

and danger of it, there have been many contrivances to fix the beak of the gorget in the staff so as to prevent it from getting out till it is in the bladder. Some of these have been attended with difficulties, others have been deemed impracticable; but I am happy in having it in my power to say that a method has been lately practised at St. Bartholomew's Hospital, by Mr. Blicke, and has been adopted by others, which bids fair to answer the purpose extremely well. It consists in the particular form of the groove of the staff and the beak of the gorget. The groove of the staff is left open as usual at the convex part which projects in perinæo, and where it is usually cut upon, after which it is narrowed, and continues so almost to the end, when it again grows wider and opens. The beak of the gorget is made with a little button or fullness at top, which readily enters the wide part of the groove; but is too large to slip out in the

whole course of it, which is contracted, and consequently it is confined, and cannot quit the route which must be right, till it arrives at near the end of the staff, and then it must be where it ought to be, in the bladder. It is certainly a good plan, likely to be of great advantage to the inexperienced, and indeed must tend to lessen the anxiety which the most experienced cannot avoid feeling on this important point. I have annexed a view of the staff, shewing the entrance and the exit of the contracted groove, and also the gorget which Mr. Blicke has made use of with this staff; it differs from the common gorget in being curved instead of straight, and having the convex side applied toward the ossa pubis. But this kind of staff may be used with almost any kind of gorget, the beak being made to fit a groove like that which has been described. Except, indeed, in very small instruments intended for infants, in which a contracted

groove



groove must be so very narrow, and must admit of so very slender a beak, as would endanger its being broken with the slightest resistance. •

On this part of the operation I have only to repeat that the gorget should be pressed in gently and slowly ; and it is seldom right to pass it up to the handle, as it is scarcely possible that our instruments shall be so exactly fitted to every individual case as to make that necessary. When the operator is conscious that it has fairly entered the bladder, and has quitted the end of the staff, it is far enough. I have more than once known a gorget, though passed in the right direction, pushed on so far, and with such violence, as to go through the opposite side of the bladder, which may easily be conceived possible in the collapsed state, when it is collected and contracted toward the neck. But if the directions laid down are observed, there will be

no danger of hurting it whether distended or not.

The gorget being introduced the staff is to be withdrawn. This should be done with gentleness, giving it the proper turn, as is usually done after searching for the stone, or drawing off the water, in short, by accommodating it to the curve of the urethra, in the same manner reversed, as when it was introduced. This is too frequently neglected in the hurry of an operation, and the staff being forced out with some violence in a straight direction, presses against the neck of the bladder, and gives pain. This method of withdrawing it is always wrong, but more particularly when every circumstance adding unnecessarily to the inevitable disturbance which the operation gives to those tender parts should be avoided.

The staff being taken out, and the gorget alone remaining in the bladder, the forefinger

finger of the right hand should be passed into the bladder, avoiding the cutting edge of the gorget. In infants almost always, and frequently in adults, the stone lies so that it may be felt with the finger; when that is the case, it is the best possible director, and the operator is often enabled to seize it immediately, sometimes even before the gorget is removed, that is, when it happens to be above the gorget, and to be sustained by it. This situation of the stone, however, is more fortunate than frequent, and I only mention it that we may be prepared to take advantage of every lucky incident.

If the stone cannot be felt by the finger, the forceps must be carefully introduced on the gorget, and the gorget should be withdrawn in the same direction in which it was introduced. And now begins a part of the operation which demands particular attention, as success greatly depends on

it. Very early in life I made an observation which has since been of infinite service to me. I remarked that in all those who died of the operation, the stone had been found and seized with difficulty; I observed, that when the operator could not readily find the stone, it was the usual practice to search after it, by chopping about in different parts of the bladder, opening and shutting the forceps with violence and force, whence I concluded, that though the blades of the forceps are made not to shut close, yet that the bladder was probably bruised and injured by such rude manœuvres *. It is better to search first with the forceps shut, making them act merely as a probe or searcher. If the stone cannot be found, they may be gently expanded and

* Instrument makers sometimes make the teeth of the forceps too sharp and too near the outward edge of the blade, which is a dangerous fault. The teeth should be kept considerably within, so that the outward edge of the forceps should present a perfectly smooth line of contact.

made to perform part of a circle, by which means the bladder will be stretched, and the stone will often fall into the lower part of the bladder, and may be then felt and laid hold of.

If by neither of those methods it is readily found, as sometimes happens, it is better not to persist in searching after it with the forceps, but to withdraw them, and introduce the forefinger of the left hand, by which, the gorget being out of the way, and the bladder contracted, the stone may generally be felt, unless in very large and fat persons, where the depth is too great to admit the finger to reach into the bladder. In infants and thin persons the stone may not only be generally felt by the finger, but the size and figure may often be determined, and the position of it altered by the finger, so as to make it more favourable for extraction.

If it cannot be felt by the finger the forceps

ceps must again be introduced, and as it is probable that the blades of the forceps have passed in too far, and gone beyond where the stone lies, which may be either in the lower part or pouch, or toward the os pubis, the finger introduced into the rectum will sometimes be serviceable in the former, as pressure above the os pubis may assist in the latter ; instances of both these I remember to have seen. In these cases it may be necessary to make use of curved forceps, which, though not often wanted, should make a part of every lithotomical apparatus.

When the stone is found and laid hold of by the forceps, before the blades are tightly closed, they should be moved in different directions to be certain that no fold of the bladder is included in the gripe. If the forceps are very widely expanded by the stone, and great resistance is consequently made to their coming out, we may very properly doubt
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whether the stone be not taken in the most unfavourable position, most calculi being longer than they are broad. By passing the finger between the blades of the forceps, this may sometimes be ascertained, and a more favourable mode of seizing it pointed out ; in which case I most perfectly agree with Mr. Cheffelden, that it is better to let the stone go, and take the chance of again laying hold of it more favourably, than to persist in using such violence, as must, if we succeed in the extraction, put the well-doing of the patient into extreme hazard. By these means the smaller axis of the stone will often come within the forceps, and a very large stone may sometimes be extracted with much comparative facility.

The manner of extracting a stone is not less to be attended to, than the finding and seizing it. When we are conscious that we have fairly and advantageously got hold of it, the forceps should be turned vertically, that
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the smooth surface of the blades may press on that part of the neck of the bladder and urethra which lies under the arch of the ossa pubis, and that which lies on the rectum, rather than that those parts should come into contact with the sides of the stone, which are often rough and irregular. In bringing out the stone it is better to press the forceps toward the rectum, than to force them against the arch of the pubes, which cannot yield or give way. And the extraction will be less difficult if we do not attempt to pull straight forward, but alternately to raise and depress the handles, at the same time that moderate force is exerted so as to gain a little ground with one blade at a time, till the stone is brought out. To extract a very large stone some have practised and recommended working with the blades of the forceps semicircularly, or from right to left. This certainly gives great power, but is doing the greatest possible mischief, as
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the bladder and all the parts in contact with the stone in its passage, must be torn and bruised. As using great force, particularly in the manner last described, must be productive of great inflammation and all its consequences, if a stone be too large to come away with moderate and gradual endeavours, it will be less dangerous to dilate the wound with the bistouri, and this may be done by cutting the bladder on one or both sides of the stone where the resistance is greatest, and the incisions can be performed with the most safety.

It often happens that stones are not sufficiently hard to bear the necessary pressure, but, notwithstanding the greatest caution is used not to press hard, break as they are coming out. When we find them giving way, to avoid breaking them still smaller, the forceps should not be tightened, but drawn out, when they will probably bring away the nucleus, and the greatest part of the fragments. The
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pieces which are left are generally in the wound, or, if in the bladder, they are brought so near as to be within reach of the finger, and unless so large as to be fair objects for the forceps, are best removed by the scoop. When the forceps has been once introduced, and is withdrawn, the way in general is sufficiently open to allow of the easy re-admission of either the forceps or scoop; but if the least doubt or difficulty occurs, the safe way is to pass in the fore-finger of the left hand into the bladder, and upon that a conductor, previous to introducing either of those instruments. The scoop will not always do alone, as it is commonly used, for, either the pieces will slip out of the shallow scoop, or the ragged fragments must be pressed with violence against the bladder and soft parts, in bringing them out. To remedy these inconveniences I would recommend, what I have often found of great use, to pass in the fore-finger after the scoop

scoop is introduced, by the side of it ; this will be often found doubly serviceable, first, in guiding the piece into the hollow of the scoop, and then, serving as an antagonist, it forms with the scoop a convenient species of forceps, which will bring away the smallest portion most safely and readily, such as would not be at all perceptible by the scoop alone, or by a pair of insensible forceps. The scoops which are commonly used are, in general, too large in the handle to admit of the finger being introduced at the same time ; there is no necessity for such strength and thickness in either the bowl or handle of the scoop, as little force is requisite to bring away a fragment.

If small particles, reduced almost to sand, still remain adhering to the coats of the bladder, it has been advised to wash them away by injecting warm water ; this may be readily done through a female catheter. But, when
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the bladder becomes naturally distended after the operation, the first gush of urine through the wound answers this purpose much more effectually than it is in our power to do.

The breaking of a stone is generally an unpleasant circumstance, as it is unsatisfactory to both patient and surgeon not to see it come away entire, and it prolongs the operation; but if the stone be very large it may prove of considerable advantage to the patient. I have known stones extracted of such magnitude, as must have required so great force to bring them away, that it was scarcely to be conceived that the patients should recover, and who, I am confident, would not have stood a bad chance of getting well, if the stones had been of a less firm texture, and had given way in the operation. Some have been found of such size as to make their extraction impracticable, and have been left in the bladder. Cases of this kind have induced practitioners

titioners to invent an instrument of more force and strength than the common forceps, by which a large stone may be broken, and afterwards extracted piece-meal by the common instruments.

By these means, though the operation is protracted, the opening into the bladder is not necessarily so dilated, nor are the parts exposed to so much pressure and fatigue in the extraction, by which the danger is proportionally lessened; for it is a truth which cannot too often be inculcated, that the length of time which an operation for the stone may require, does by no means necessarily increase the danger of it. *Sat cito si sat bene*, was never better applied than to this operation. The danger of it does not arise from the number of times which it may be necessary to repeat the introduction of the instruments, but on the degree of force or violence with which they are used. It should never once

flip the memory, that though the extraction of the stone is the immediate object, the safety of the patient should be the principal consideration, and that little honour can be derived from the quick performance of an operation which proves destructive.

If little or no injury is done to the bladder except the necessary wound with the gorget, it approaches nearly to a simple incision, which is well known not to be particularly dangerous in that viscus.

It is commonly remarked, that if the sides of a stone when extracted are smooth and polished, it is an indication that there are more than one; if rough, and the asperities not worn, that it was single: however these marks are not absolutely to be depended on, as we have seen single stones frequently smooth, and sometimes rough where there have been more than one. The only way of certainly judging, if the bladder be emptied, is, by searching
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with the finger, or if it be too deep, with the forceps shut, or an instrument called a searcher.

I have hitherto described the operation as it is to be performed in cases which are most commonly met with, but in a variety of practice, circumstances may sometimes occur, which, to an experienced operator, will appear new. We hear and we read of cases in which, though the stone has been plainly felt by the forceps, yet could not be taken hold of so as to be brought away, though attempted in the most skilful manner. This certainly may happen if the stone be contained in a sacculus, only a small part being exposed to the touch of the instrument, and probably would have happened in the case of Gardiner, the person who was the cause of Mrs. Stevens receiving the reward from Parliament for a medicine which had the character of dissolving the stone. When the person died, his bladder was ex-

mined, and several stones were found concealed in different sacculi, which, not being liable to be pressed on by the bladder, gave no pain, nor could be felt, and were consequently supposed to be dissolved. Such cases very seldom occur; in my own practice I have met with but one instance in which it was probable, but not proved, that there was a sacculus. Some account of this case it may not be unuseful to mention. A boy, about five years old, was afflicted with symptoms of the stone. On searching him a stone was felt, and the operation was determined on. A few days after, when I was going to do it, and had introduced the staff, no stone could be perceived, on which the operation was deferred. The painful symptoms returning he was again searched, and the stone was again felt, and the sound of it, when struck by the instrument, distinctly heard. In consultation it was determined that the operation should

should be performed. On putting him in the proper position, the stone again was not to be felt; however, as his sufferings required relief, and the stone having been perceived to the conviction of every one present, could not possibly have escaped from the bladder, it was resolved to pursue the operation. Accordingly I performed it, but when the incision was made no stone could be found by the finger or any instrument. On which the boy was dressed and put to bed. In a few days a stone shewed itself at the wound, and I took it away; it was rough, irregular, and about the size of a hazel nut.

I was present at another operation on a boy, on whom a stone had been felt, but could not be found at the time of the operation, nor was any discovered during the healing of the wound; but some time after it was completely healed, and the boy suffered to walk about, he one day complained to me that he felt some-

thing hard near where he was cut. I felt, and plainly perceived a small stone under the skin in the perinæum, within half an inch of the beginning of the incision ; I made an opening and took it out, and it is now in my possession. It is probable that both these stones were enclosed in facculi at the time of the operations, and that afterwards, some position favouring their exit, they found their way into the cavity of the bladder. The subsequent passage of them through the wound was a fortunate, though a natural consequence, and leads to hope, that if by accident a portion of the stone should at any time be left behind, that it would, in like manner, be discharged by the contraction of the bladder.

The stone will sometimes be so engaged with the neck of the bladder, that, though the staff and gorget have passed, there is not room for the forceps to enter far enough to take hold of it ; or, if they pass in, go beyond,

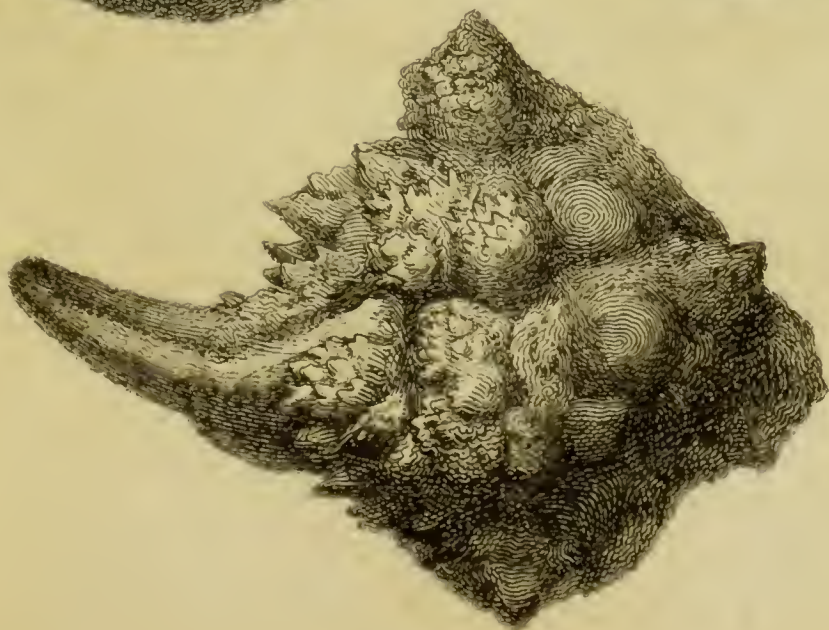
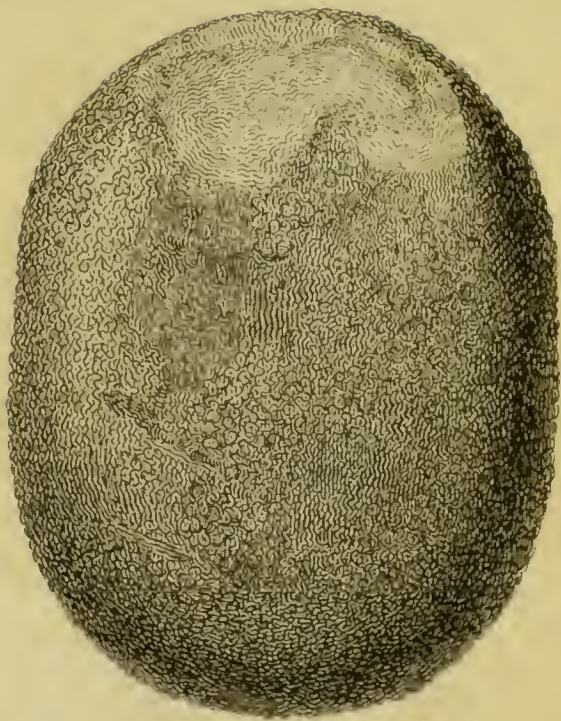
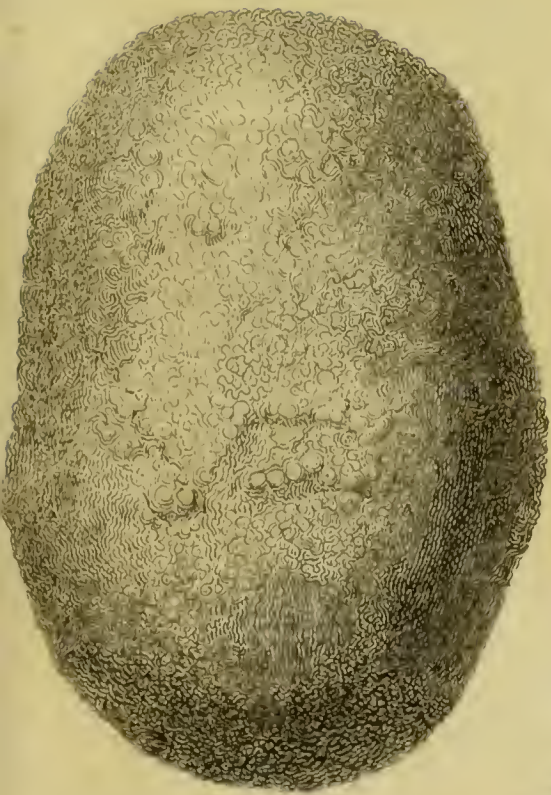
yond, so that they chop on it near the joint, and cannot seize it. This is a difficult and troublesome case, however the operator will frequently succeed by withdrawing the forceps, and endeavouring to push the stone before it into the bladder; sometimes, if the stone be hard and irregular, it may be possible to get sufficient hold of it with a small pair, without forcing it out of its position.

Another very unpleasant case is when the stone lies buried in a fungus. Ruysh, Heister, and other authors, have mentioned cases of this kind. Such sometimes, though seldom, occur: fortunately I have met with but one instance which has fallen under my particular care. This was in the person of a young man who was sent from Rochester to St. Bartholomew's hospital, and as there were some singular circumstances attending it, I shall take the liberty to relate them.—He was about eighteen years of age, had been afflicted with

symptoms of the stone during several years, and had suffered exquisite pain, which had nearly worn him down to the extreme verge of life : from his emaciated appearance little hopes were entertained of his recovery ; however, as his disease had originally arisen from, and had been caused by a stone, which was plainly to be felt, I could not refuse him the only chance he had of relief. On passing in the staff it met with great obstruction at the neck of the bladder, and when introduced was firmly fixed, and the feel of a stone at the end of the instrument very distinct ; the gorget passed with equal difficulty. On attempting to introduce the forceps, I found it impracticable, as the stone had completely blocked up the passage, and I was obliged to withdraw the gorget ; the patient being very thin and relaxed, I was able to examine accurately with my finger the state of the parts. I found a large hard substance filling
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the whole neck of the bladder, containing a rough stone, bare only in one part, and apparently immoveable. On reflection I conceived it might be possible to get sufficient hold of it without altering the position; accordingly, my finger serving as a director, I passed in a small pair of forceps, and was able to open them sufficiently to get hold of part of its craggy surface, when fortunately it came away without it being necessary to use much force. On examining the stone, it had evidently adhered to the neck of the bladder, and had lain in a fungus, as the inequalities were in every part filled with a fleshy fungous substance; but I was happy not to be able to discover in any part, any thing like the membranous coat of the bladder; indeed, the resistance to the extraction would have been greater if the bladder itself had been torn: the form of the stone will best appear in the annexed figure; it completely filled the neck and lower part
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of the bladder, and a process about one inch and a half in length, extended down the passage of the urethra. In the superior part of this process, or that which lay toward the pubes, was a groove through which the water had passed, after having trickled down between craggy parts, so that among all his complaints he had never experienced a stoppage of urine; indeed this is a symptom, which, as has been remarked by that accurate observer Mr. Pott, people with adherent stones never suffer. The staff had made its way between the lower part of the stone and the urethra, and the gorget had evidently followed the same route: no material hæmorrhage succeeded the operation, nor did the patient experience any bad symptoms, but such as arose from his extreme weak state; he lost all painful complaints, the wound perfectly healed, and he returned to Rochester, where he lived many months after the operation.



Stones adherent to the bladder, as was observed, are very uncommon; probably, when they happen, the adhesion is caused, as in the present instance, by fungous excrescences, produced by irritation and inflammation from the internal coat of the bladder, and shooting into the cavities of the stone. The case here recited is a strong instance of the practicability and safety of removing such stones, provided the membranous coat of the bladder itself be not injured by the extraction *.

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* Some other human calculi are included in the plate, remarkable for their size or shape.

Since these sheets were in the press I have seen a case, which, in point of situation of the stone, was similar to that which I have been describing, in a boy about five years old, in whom the entrance into the bladder was so completely blocked up, as to make the passage of a staff absolutely impracticable.—The extraction of it was performed by a gentleman, whose rising fame I have pleasure in contemplating, who, whether considered as a practitioner in surgery, a teacher of anatomy, or a philosopher, deserves to be mentioned in the most encomiastic terms.

On introducing the staff, it would pass but a little way
beyond

The next circumstance to be considered is, the hæmorrhage. I believe it may be laid down as a fact, that if the bulb be not divided in the division of the urethra, that there is seldom any considerable hæmorrhage, but I do

beyond the inferior arch of the pubes, or beginning of the membranous part of the urethra. After having divided the integuments, Mr. Abernethy made an incision on the end of the staff, which was then withdrawn, and passing the finger into the urethra, a large stone was plainly to be felt. As it was impossible to introduce a gorget, he passed a probe pointed knife by the side of the stone, and divided the remainder of the urethra and neck of the bladder, in the direction in which it is usually divided by the gorget; he then endeavoured to use a pair of forceps which he had provided with separate blades, which were to be connected by a center pin, nearly like those used in midwifery: one blade passed easily, the other with more difficulty, and not deep enough to admit of connexion with the other at the center. Not finding them answer, a pair of common forceps were used, which being made to expand carefully without injuring the bladder, the stone was laid hold of, but broke in coming out; it was seized again, but again receded when nearly brought out: it was now observed that the forceps had been badly tempered, and had bent and given way. On another pair being introduced it was extracted, and proved to be a large, soft, and ragged stone; the part which was extracted whole was about one inch and a half

do not by any means assert that it is always in the power of the most skilful operator to avoid it. The arteries most liable to be wounded in this operation are the *pudicæ externæ*, the principal branch of which, on each side, running on the inside of the *tuberculum ischii*,

half in diameter. On searching with the finger another was found in the cavity of the bladder, which was easily extracted, and proved a stone of uncommon form, being perfectly cylindrical, about two inches in length, and three-fourths of an inch in diameter, and seemed to have been moulded to some cavity. It appeared to me, that by some previous operation of endeavouring to pass a staff, or by some unaccountable accident, that the two stones had changed places, that the one which had been originally formed in the urethra had slipped into the bladder, and that which had been formed in the bladder had been forced into the urethra; which was the more probable, as the urethra must have been greatly dilated by the formation of the cylindrical stone; and that stone being displaced, the passage was sufficiently open to receive any other which might be forced into it. Notwithstanding the necessary tediousness of this uncommon operation, the bladder having been carefully kept from injury, the child passed a good night, and was without a bad symptom the following day. I have the pleasure to add, that all danger is passed, that he continues to improve, and is in a fair way of doing well.

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and following a little way the course of the erector penis, and crura of the corpus cavernosum penis, is in the way of the knife. It often happens that some of the ramifications of these vessels are divided, either by the instruments, or sometimes by the angles of a rough stone in its passage out: if the vessel be large and bleed freely, and can be easily got at, it may very properly be secured by a ligature, but if very deeply seated, and out of sight, it is, generally speaking, better to leave it than to search and poke after it. The pressure of the sides of the wound against each other will probably be sufficient to stop it: it may continue for some time to bleed into the bladder, and to be voided by the penis, which certainly appears alarming to persons unaccustomed to see it, and most undoubtedly a very unpleasant circumstance it is, to see a hæmorrhage which we cannot master; yet, I speak from
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my own experience and from that of the late Mr. Pott, that I never knew a bleeding after an operation for the stone prove of material, or serious consequence; at the same time, I do not deny that there may be cases in which the hæmorrhage may be so violent as to make it absolutely necessary to find the bleeding vessel, or if that be not practicable, to apply styptic applications, by means of a tent passed into the wound, to restrain it; I only mean that if it can be avoided it will be advantageous, as all such applications tend to increase inflammation, and prevent the union of the sides of the wound. It sometimes happens, that though there be no bleeding of sufficient consequence to be noticed immediately after the operation, and the wound be consequently dressed, a small weeping of blood will come on when the patient is warm in bed, which, in an hour or two, will increase

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to something considerable : on taking off the bandage and dressings the wound will be found filled with coagulum, and a small stream, from time to time, issuing from under it ; this may reasonably be supposed to come from one or more small vessels ; as it is probable that a large one would have bled in the first instance : it is in vain to expect, as has been asserted, that the coagulum will stop the bleeding ; on the contrary, it will rather tend to increase it, by keeping the mouths of the vessels in a state of relaxation and moisture, at the same time it conceals the place whence the bleeding originates. The whole of the coagulum should therefore be immediately removed, and the bleeding will generally be seen to arise from several small vessels ; when this is the case, the mere exposure to the cold air, being so strongly contrasted with their prior warm situation, is generally, alone, sufficient,

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in a very short time, to contract the mouths of the vessels, and cause the hæmorrhage completely to cease, without styptic or any other application *.

With regard to the manner of dressing the wound, we read of cannulæ and tents being introduced; but, if the operation has been properly performed, and the whole of the stone extracted, there can be no reason why it should not be dressed simply and externally, like any other accidental wound; the sides of the wound, being thus suffered to come into

* This observation is applicable to other operations, such as amputations, or the removal of large tumors; in which it often happens that small divided vessels, apparently quiet at the time of dressing the wound, are afterwards excited to emit their contents by the warmth of the dressings, bandages, and bed, added to the increased circulation which always takes place after operations of consequence. When the wound is undressed, the coagulum removed, and the surface completely laid bare, an alarming bleeding appears flowing from numberless mouths, but these shrink and contract so soon as they are exposed to cold air, and, provided the larger vessels were secured at the time of the operation, all appearance of hæmorrhage ceases, and there is no return.

immediate contact, would unite like an incision in any other part, but for the interruption which is caused by the passage of the urine, which washes away the agglutinating medium and hardens the superficies; the time when this ceases to flow through the wound differs from a variety of circumstances, such as the size of the wound and constitution of the patient; but this period may be sometimes accelerated by very simple means: as these may be useful and worth attention, I shall take the liberty to explain my meaning, by relating some circumstances relative to an operation which I lately performed on a gentleman about thirty-five years of age. The stone which I extracted was not large, and the wound so little injured by its passage out, that it was scarcely more than a simple incision; the greater part of the urine came by the penis the first night, and so continued to do till
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the fifth day, when it ceased to come by the wound at all, and the whole passed through the penis during two nights and two days, when the patient having inattentively suffered the bladder to be very full, and endeavouring to empty it at the same time that he had a stool, it again burst its way through the wound; I directed the nurse to tie the bandage rather tighter, desiring him to empty the bladder more frequently, and every time that he made water, or sneezed, coughed, or, in short, used any exertion, to apply his hand to the sides of the wound, and to keep it closed: by attending to this plan, not a drop afterwards escaped, and there was no further interruption to the healing of the wound, which was completed in as short a time as a wound of the same size would have healed in any other part *. I cannot avoid noticing an
 observation

* It may not be useless to remark in this place, that I have many times cured that most difficult and troublesome
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 disease,

observation which this Gentleman repeatedly made during his cure, that he would rather suffer the operation every fortnight to the end of his life, than to live liable to feel what he had experienced in fits of the stone.

It should be mentioned, that it is right to keep the knees of the patient close together, particularly if he be an infant, by a tape passed round them during the first part of the healing of the wound, or indeed till the urine has found its natural passage; that the best position for patients to lie in is, in general, on the right side, as that gives the wound an op-

diseased, the fistula in perinæo, and in some instances where the water found its way through several openings, by making patients attend to the simple manœuvre of pressing with the hand during micturition, on that part of the urethra from whence the water issued. Of such importance it is to give nature an opportunity of pursuing her own process, which is always tending to heal and consolidate, unless checked by some disease or accidental circumstance. Thus, if the urine can be prevented for a certain time from passing through the opening in the urethra, the external openings, and all the parts, have an opportunity to regain their natural tone and disposition to heal.

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portunity of discharging itself, and that the patient should not be suffered to rise and walk, till the urine passes through the natural passage, and till the greatest part of the wound is healed. Excoriations of the skin may be prevented by placing a sheet under the patient several times doubled, so as to be in breadth about eighteen or twenty inches; it must be coiled up, all but as much as is necessary to be laid under him. At first the remainder of the roll is put by his side, which unrolls as the nurse draws the wet part from under him; by this method he is kept almost constantly dry.

The fate of those who undergo the operation of lithotomy, may generally be prognosticated in the space of a few hours: if the operation has been well and happily performed, no other care is requisite than to repeat the anodyne so soon as the patient is placed in a warm bed, and to keep him perfectly quiet.

If all goes on right, he usually soon gets sleep, and in a few hours after the operation a discharge of water gushes from the wound. It may be proper to remark, that as this is generally very much mixed with blood, which has found its way into the bladder, it is often mistaken for a violent hæmorrhage, and is very alarming to nurses and people unaccustomed to see it, but if the linen which is coloured with it be examined, the dilution of the blood will be apparent, and the urinous smell will confirm it. In the happy sequel of the operation I am now describing, the belly continues soft, and no pain is felt from gentle pressure; the night is passed in the same calm state, and he is found refreshed in the morning: these favourable symptoms continuing till the third day, all danger derived from the operation may be concluded to be past; but our attention to the general health of the patient should not be less: his diet should be

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light and of easy digestion, yet sufficient to support and give strength; his bowels should be gently relaxed, and occasional clysters, I have ever found, most essentially serviceable.

If the bladder has received material injury from the ill performance of the operation, from the shape and figure of the stone in its passage out, or from any other cause, the good and hopeful symptoms described are, too often, completely reversed. Soon after the patient is in bed his pulse increases, he feels a degree of restlessness and anxiety, and with difficulty is persuaded to remain quiet in any posture; if some sleep be procured by opium, he starts and wakes, and feels a tension and pain in the lower part of the belly or region of the bladder, which will not bear even gentle pressure. And no water coming through the wound in a few hours after the operation is always an alarming circumstance.

When such symptoms approach, the most powerful means are immediately to be employed; among these are to be enumerated oily purgatives, anodyne and antimonial draughts, emollient and anodyne clysters, fomentations, and cataplasms applied to the abdomen; but, above all, that universal relaxation which can only be procured from the warm bath, should not be neglected. A bathing tub, though not always necessary, should be at hand and ready after every operation for the stone, which, if required, may be easily conveyed into the patient's chamber. If it be thought right to immerse him in it, he should, when taken out, be put between blankets, and a gentle sudorific should be given; as soon as this takes effect, and produces a moisture on the skin, the patient frequently becomes easy, and the fever abates. By such means we are sometimes able to meet and repel the approach-

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ing mischief, but, as fire is most easily quenched on its first appearance, our success greatly depends on the early application of them.

If, in opposition to our best endeavours, the inflammation does not abate, it is soon communicated from the bladder, where it begins, to the surrounding cellular membrane; the ureters and kidneys usually soon receive the alarm, nephritic pains are excited, and little or no water is secreted; if it extend over the peritonæum and intestinal canal, it produces an antiperistaltic motion, followed by pains and frequent nausea, and the inflammation still increasing, a mortification often takes place: increase of fever, continual pains, and swelling of the hypogastric region, are the first signs of its approach, tension of the whole belly, attended with hiccough and vomiting, soon follows, the pulse sinks, the patient grows weak, and in a short space of time the painful scene is over.

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I have observed that the female sex, from the form and situation of the urethra, are less liable to the formation or retention of stones in the bladder than men; for the same reasons, when they are formed, the operation for the extraction of them is proportionally less difficult. The shortness and direct course of the urethra permitting the sound to be turned freely in every part of the bladder; we have greater opportunities of judging not only of the size of the stone, but in some degree of its shape and the irregularities on its surface, which may tend to point out the best method of taking hold of and extracting it.

The methods proposed are, either by the dilatation or the division of the urethra. If the stone be of very small size the first is certainly preferable. It has been attempted by various means, such as sponge tents, dried gentian root, and an instrument called *speculum vesicæ*, by which sufficient room has been made
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for the introduction of the necessary instruments. A case has been related in which an ingenious contrivance succeeded remarkably well; the *appendicula intestini cœci* of a small animal being introduced into the bladder, warm water was thrown into it by the open end, which was left out of sufficient length, and was prevented from escaping by a ligature; it was then twisted a turn or two, that the water being pressed on might distend the close end in the urethra. This was repeated from time to time, so as to fill it more and more, as the *cervix vesicæ* opened; thus, by degrees, in this instance, sufficient dilatation was made to permit the exit of the stone without the necessity of any other operation. This appears to be preferable to the sponge or the other ordinary methods; but unless the stone be of such size as to give hopes of its passing without the necessity of introducing any instrument, or only one of a small size,

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I should prefer the division of the urethra to violent distention, as I conceive the power of retaining the urine more likely to be recovered after the former than the latter.

When the operation is determined on, the time to be chosen for it should be the interval between the monthly evacuations. The situation in which the female patient is to be placed, is that which has already been described for men. The female staff is to be introduced into the bladder with the groove toward the vagina, and the cutting gorget appears best calculated to make the division of the urethra ; the beak of it should be fixed in the groove of the staff, and pressed gently on till it arrives in the bladder, by which the neck of the bladder is sufficiently divided, and neither bladder nor vagina is liable to be injured ; the stone should then be examined by the finger, and the extraction should be attempted and conducted by the forceps, in
every

every respect as recommended in the operation on men. After the operation the same conduct should be observed, and it will be right to let them lie on the right side, to prevent as much as possible the urine from insinuating itself into the wound, which would impede the union of the divided parts; the restoration of the natural state of the neck of the bladder, and consequently the power of retaining the urine, depend greatly on the prosperous and speedy healing of the wound.

The stone being in general more easily extracted from women than men, and the whole of the operation less complex or difficult, the consequences of it are proportionally less hazardous; but from long experience I can truly assert, that in either sex when the operation of lithotomy is properly performed, the event of it is much more favourable and successful than it has been represented to be. So long ago as when Mr. Cheffelden practised, we
learn,

learn, from his own account, that, out of 213 whom he cut, 20 only died. I hope and trust that since his time we have not gone backward either in knowledge or skill; on the contrary, I am inclined to think, that, principally with the assistance of that most excellent invention of Sir Cæsar Hawkins, the cutting gorget, we have greatly improved the operation, and rendered it more safe and prosperous.

In some degree to corroborate what I have advanced, I shall follow the example of Mr. Cheffelden, in relating what has happened in my own practice. My first operation of lithotomy was in the year 1770, at St. Bartholomew's Hospital, after which I occasionally performed it in the absence of the principal surgeons till 1776, when, from the accidental inability of Mr. Crane, the operative part of his duty devolved on me; from that time I have operated on one-third of all the stone

patients who have been received into that house, besides many in private: in the earliest part of that period, not foreseeing that I should one day wish to recollect them, I was not attentive to make memoranda of every case which occurred; I have an account of forty-seven, but the total amount unfortunately I have no means of ascertaining; however, I feel the greatest possible satisfaction in being able to declare, that of all the patients I have ever cut for the stone, in public or in private, one only did not recover; and as there were peculiarities in the case of that person, in justice to the operation, they should be noticed: when I first saw him he was a healthy young man about twenty years of age, and in every respect as good a subject as could be chosen: the stone was readily to be felt, and the operation was recommended, but it was not complied with, the patient having been advised to endeavour to get rid of it by a course

course of lithontriptic medicines : these were given and persevered in above two months, but unfortunately they did not only fail of dissolving the stone, but did not relieve the pain, which continued to distress him, in an uncommon degree, during the whole time : at last, worn out with pain and much impaired in health, he begged to have the stone removed ; this was accordingly done, with the fairest prospect of success, as far as regarded the operation : the stone was immediately and fortunately seized, and readily extracted ; no hæmorrhage, nor any bad circumstance occurred ; and there was every reason to expect success. He passed the next night and day well, and so continued to the third day, when he appeared so well, that there was not room for an anxious thought about him : on the fourth day he was seized with a rigor, and expired in a few minutes : his bladder was examined after death, and was found thickened

ened and diseased, bearing evident marks of the continued inflammation and irritation which it had suffered from the rough surface of the stone, and perhaps from the action of the solvent medicine *.

I conceive the loss of this patient cannot be fairly ascribed to the operation, as the dangerous symptoms which arise from the performance of it take place much earlier; and it is probable that, had it been performed when the bladder was in a better state, it might have perfectly succeeded; I speak this with some degree of confidence, as he appeared, when first I saw him, as was observed, a healthy promising subject.

Those which have fallen to my lot have

* The recollection of this case leads me seriously to recommend not to perform the operation of lithotomy in less than a month, from leaving off a course of what are called lithontriptic medicines, and during that time to keep the patient in a quiet state, in order to give the bladder the best opportunity of recovering from the irritation which it has suffered.

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been of almost all ages, from under two years to near seventy. Some of the stones extracted from them were very large, others of a dangerous kind from the irregularities and asperities of their surface; and in some cases considerable difficulties occurred in extracting them. Among the number of patients also, as may be supposed, were many bad subjects, from age and from constitution, as I do not know that I ever rejected one: yet, out of them all, I repeat, that this young man alone did not recover.

I have now, to the best of my abilities, completed what I at first proposed, and have unreservedly communicated the result of my experience; should it in any degree tend to strengthen the resolution of the afflicted, or to aid the hand administering relief, my intention will be fully answered.

I cannot, however, conclude without saying something by way of apology for any ap-

pearance of ostentation in having given an account of my own practice.—Perhaps, the many anxious hours which, previously to an operation of such importance, every humane practitioner must pass, and which a continuance of success will not avert, might allow a small share of pride to arise from the successful performance of it. On the present occasion I can only say, that I thought it proper to be produced in vindication and support of a necessary and useful operation.

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APPENDIX

TO A

TREATISE ON LITHOTOMY.

CONTAINING

A DESCRIPTION OF AN INSTRUMENT CALCULATED
TO IMPROVE THAT OPERATION.

By JAMES EARLE, Esq. F.R.S.

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AND

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LONDON:

PRINTED FOR J. JOHNSON, NO. 72, ST. PAUL'S CHURCH-YARD.

1796

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APPENDIX, &c.

THE operation of lithotomy has engaged the attention of many ingenious men, and a great variety of instruments have been contrived for the performance of it. In this country the grooved staff and cutting gorget are most generally in use, and from the simplicity of their construction, which must be admitted an excellence in all surgical instruments, they will probably continue to supersede many other inventions: yet well contrived as these instruments are, they appear to me capable of being improved. In the following pages I shall take

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the liberty to offer to the consideration of practitioners a method which has recently occurred to me, and which, as I conceive, will render the operation less painful and hazardous, and prevent the inexperienced operator from error in the performance of it. As it is a subject which interests a considerable part of mankind, I have not delayed to make it public, that if, on examination, the instrument which I shall describe be thought worthy of being adopted, its use and application may be thoroughly understood, and the knowledge of it more generally extended.

In 1793 I published a treatise on the operation of lithotomy, in which I endeavoured to describe the best method I then knew of performing it. In that part which relates to the introduction of the gorget (page 50) it was observed, that the first and greatest difficulty in the operation occurred in introducing

ing the beak of the gorget into the groove of the staff, and in conducting it into the bladder; that the principal danger in this part of the operation arose from the possibility of its slipping out before it entered the bladder, and passing between the bladder and rectum; that many fatal accidents of this kind had happened from this circumstance; and that the apprehension of them was a cause of anxiety to every operator. To remedy this inconvenience, and to take away every chance of such an accident, and also to enable the surgeon to execute this part of the operation with more confidence, I described an improvement which had been invented in the staff, which consisted in making the groove narrow immediately beyond the part which admits the beak of the gorget, and in continuing the contraction to near its extremity, so that the beak of the gorget being made with a small neck, and a

little button or fulness at the top, readily enters into the wide part of the groove, but cannot slip out again, till it arrives at the end of the staff, when, if the stone has been previously felt with the staff, it must be in the bladder. This contrivance, after repeated experiments, has been proved to answer the purpose extremely well, having been frequently used with success at St. Bartholomew's Hospital, as well as in private practice. Still however the operation appeared to me imperfect, as I observed that in the division of the urethra, in order to find the groove of the staff, a considerable difficulty frequently occurred, insomuch that it became necessary to make several cuts or incisions down to the staff, before the way was sufficiently open, and the staff laid sufficiently bare to admit the beak of the gorget to enter satisfactorily into the groove; not to mention the risk of the gorget's hitching

in some of these ragged incisions, and slipping on either side of the staff, which sometimes happened. It was impossible not to remark, that some of these circumstances often very considerably prolonged, and increased the pain and hazard of the operation.

The difficulties and obstructions which have been specified, may arise from several causes—from the thickness of the urethra and muscles which cover it, preventing the groove from being distinctly felt; from the mobility of those parts, whence they are liable to slip on one side of the staff; from the unsteadiness of the hand of the assistant who holds the staff; from the motion of the patient throwing it out of its position and altering its situation; or, lastly, from want of dexterity in the operator.

Whoever has been accustomed to see the operation of lithotomy performed by dif-

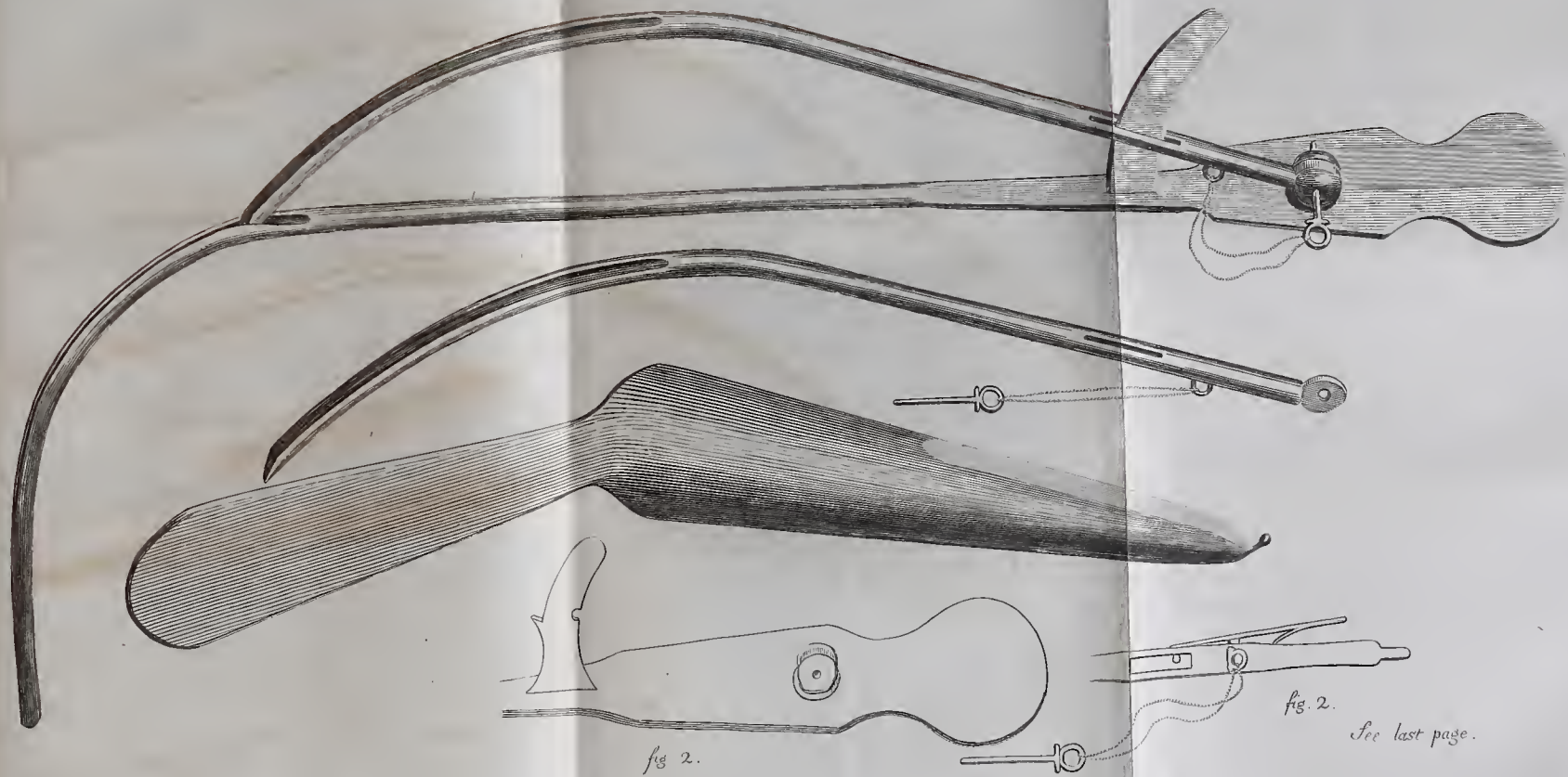
ferent furgeons, must be fenfible of the inconveniences and frequent embarrassments attending this part of it, and must, I think, admit that great advantage would be obtained if a mode could be adopted by which the groove could be immediately laid bare so as to admit the introduction of the gorget without any delay or uncertainty; at least I must confess that the attainment of this object always appeared to me very desirable, and I feel no small degree of satisfaction in conceiving that I have overcome the difficulty by the contrivance of an instrument which will make the opening through the urethra with dispatch, certainty, and precision.

The instrument consists of a short staff, with an open groove, connected by a hinge to the handle of another staff of the usual size, shape, curvature, and length, but which, for the sake of distinction in describing the instrument,

instrument, I shall denominate the *long staff*. The hinge by means of a pin or moveable axis is capable of being disjoined at pleasure. The short staff is sufficiently curved to go over the penis and scrotum, and long enough to reach to that part of the long staff which is just below the beginning of its curvature. The end of the short staff made somewhat like a pen, with the sides sharpened and finely pointed, is adapted to shut into the groove of the long staff, and its cutting edges are defended from being injured by a proper receptacle which is prepared for it in the groove of the long staff. When the instrument is shut, the groove of the short staff leads into that of the long staff, so as to form one connected and continued groove. It is necessary that the short staff be made strong and firm, to resist any lateral pressure; and, for the same reason, a segment of an arch is fixed on the long staff at a short distance

from the hinge; which being fitted to pass through an opening in the short staff, effectually keeps it steady, and prevents the point from deviating on either side of the groove, so that when shut down the point of the short staff is certain of passing into the cavity formed for its reception. The annexed plate will perhaps give a clearer idea of the instrument than is in the power of verbal description to convey.

It will be observed that the engraving is taken from an instrument adapted to a staff with the contracted groove, and that the point is made to shut in just where the contraction of the groove commences. But as every one may not be in the habit of using, or may not approve of the staff with the contracted groove, it is proper to remark, that this contrivance is in every respect equally applicable to the common staff; and indeed may be made to fit with greater facility



lity and exactness into a staff where the groove is open than into one in which it is contracted.

We will now consider the use and application of the instrument. The patient being placed and fixed in the usual situation for the operation of lithotomy, the long staff unconnected with the short one is to be introduced in the usual manner into the bladder. The stone being satisfactorily felt, the short staff is to be connected at the hinge, which by means of the pin is easily effected. The incision is then to be made in the usual manner through the skin and cellular membrane, and a second incision through the muscles, so as nearly to lay bare the urethra. The operator then being perfectly convinced that the extremity of the long staff is safely and sufficiently introduced into the cavity of the bladder, must bring the end of the short staff down, and press it against the urethra, which

which it will immediately pierce through and pass into the cavity prepared for it in the groove of the long staff. I must repeat that the operator should be thoroughly satisfied about the situation of the long staff before he brings down the short staff, because, after the two are closed together, no further motion of the instrument seems necessary, nor indeed can be conveniently effected to any considerable degree.

When the opening is thus made through the urethra, and consequently the point of the short staff fixed in the groove of the long staff, the two staves are to be held firmly together by the operator's left hand, and nothing remains but to apply the beak of the gorget to the groove of the short staff, and to push it on till it be received in the groove of the long staff; and if the staff be made with a contracted groove, it will enter just where the contraction begins, and thus *must* be

be safely conducted into the bladder. This being accomplished, the staves are to be withdrawn, and the gorget continuing in the bladder, the operation is to be finished in the usual way. With regard to the remainder of the operation, every circumstance which appeared to me important in the performance of it, I have endeavoured fully to detail and elucidate in my treatise on that subject, so that it is unnecessary for me to make any observations on it in this place.

Such is the instrument which I have been sedulous to contrive from conviction that some method was wanting to obviate the difficulties and inconveniences which have been mentioned; I hope it will be found to answer the intended purpose, and that by these means the most obscure and distressing part of the operation may be performed with equal facility as any other part of it, and the operation in general rendered less painful, and more safe and expeditious.

It has been observed, on various occasions, that one right measure being adopted, it often happens that many good consequences, at first perhaps not obvious, are derived from it. Thus it appears to me, and I shall endeavour to shew, that from the method of performing the operation of lithotomy, which I have described, several important advantages, unthought of at the time of inventing the instrument, will be obtained. These I shall endeavour to point out in order as they would occur in performing the operation.

Happily for mankind the stone in the urinary bladder is not so common as many more tolerable evils to which the human frame is subject, consequently lithotomy, not frequently occurring, cannot be so familiar as many other operations; for which reasons, and also on account of the different size and shape of the parts in different subjects, it happens that at the commencement of the operation a doubt or uncertainty

certainty sometimes arises where to begin the external incision, and how far to extend it. In the usual operation the first object of the external incision is to give room for the introduction of the gorget and the expansion of the forceps in bringing out the stone; but this must be made to correspond with the second incision, which is to make way down to that part of the urethra which covers the staff where it is necessary to be exposed for the reception of the gorget, and this in the common staff is the part of the groove just above the curvature. When the staff is in the urethra, either from the thickness of the parts which cover it, or from the difference in the lengths of different urethræ, or from the staff having more or less entered the bladder, it certainly is not always an easy matter to determine the situation of this part of it; and the difficulty of ascertaining this point is still greater, and of more consequence, where

where the staff with the contracted groove is used, as it is then necessary to fix on the precise part where the groove is dilated, and the contracted part begins, otherwise the beak of the gorget could not be introduced.

It will, I presume, be perceived that this instrument, at once, effectually determines this important point, for so soon as the staff is introduced through the urethra into the bladder, and the stone is felt, the short staff being brought down over the scrotum, and made to touch lightly on the perineum, instantly shews where the contraction in the groove of the long staff begins, and where the opening is to be made into the urethra, consequently the operator will take it for his guide in making the external incision, and that he may have room to handle his instruments and bring out the stone, will begin his incision an inch, or as far as he judges proper, above the part to which the instrument

ment points, and carry it down two inches, or so far as he thinks right, below it, toward the tuberosity of the ischium. The same observation will also be a sufficient direction in making the second incision.

After long experience of the operation of lithotomy, and repeated observations on the performance of it by others, I cannot but consider the ascertainment of the precise part where the incision is to be made, particularly when the staff with the contracted groove is employed, of very material consequence; indeed it appears to me so necessary a desideratum, that if this, which is but a secondary consideration, were the sole object attained by the instrument, I should not think my time had been misapplied in inventing it. But we will examine further, and I flatter myself that still greater advantages will be found derivable from it.

When the external incision is completed,
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the next consideration is what part of the urethra it is most proper to divide in order to admit the gorget : I believe this will universally be allowed to be the membranous, as it is the thinnest, most easily dilatable, and least furnished with blood vessels. Now, however well skilled in anatomy an operator may be, or however accustomed to operate, it is not always in his power, when he is dividing the urethra with his bistory, to prevent the incision from being made longer than necessary, and also to avoid cutting into the bulb, which being a part of the urethra that does not readily admit of dilatation in the extraction of the stone, and is most commonly the seat of those troublesome hemorrhages which so often occur in the operation, ought not to be wounded. If the most skilful are sometimes not exempt from such accidents, how much more vague and uncertain must the direction of the knife be
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in the hands of persons not much accustomed to operate. Such practitioners, for such there must be, I principally mean to assist, but I flatter myself that the instrument which has been described will not prove unacceptable nor unuseful to the experienced and well informed, if it shall appear that it may be contrived and adapted to divide with certainty the membranous part of the urethra only; but in order rightly to comprehend this effect of the instrument it should be premised and observed, that in performing the operation with the staff which is commonly used, it is intended that the operator should, after the external incision is made, find with his finger the fulcus into which he is to make his incision, and then by the guidance of his finger to introduce the beak of the gorget; this he would not be able to do unless the fulcus was grooved higher than the curvature of the staff; and in those staves in which the fulcus

is contracted, the contraction actually begins above the curvature, for the same reason, viz. that the operator may readily find where he can safely lodge his gorget. The inevitable consequence of this is, that the incision is always made higher than is necessary, and the bulb of the urethra consequently can scarcely escape being wounded by the bistouri, and indeed is frequently divided by the gorget, which must pass downward, and then follow the curvature of the staff, before the hand of the operator can be lowered so as to bring the gorget to a straight line, in order for it to pass under the os pubis into the bladder. All this cutting above the curvature, I am persuaded, every judge of the operation will allow to be unnecessary, and, if possible, ought to be avoided. By the staff which is used with the instrument under our present consideration, this defect in the common operation is done away, as the groove into
which

which the beak of the gorget is to enter, not being required to be examined by the finger, need not commence till just before the turn begins which conducts it under the os pubis, and as the opening is made in that part by the short staff, the gorget passes immediately into the membranous part of the urethra without injury to the bulb.

From the same circumstance also it will be observed that another material advantage is gained, if it be recollected that the passage of the gorget round the curvature of the staff was always considered the most difficult part of its introduction, and also the most hazardous, from the possibility of the force, required to press it downward, causing it to slip off at a right angle from the bottom of the curve. By using the instrument described this danger is avoided, as, the introduction of it being nearly straight forward, there is no necessity for any downward pres-

ture; and by the same means the opening into the urethra being made in the part where the incision of it, which is made by the knife in the common operation, terminates, the operation on the male becomes nearly as simple as when it is performed on the female urethra. All which I should imagine must be allowed to be considerable and manifest advantages.

On the whole I hope I have made it appear that this instrument, which may be called the double staff, first clearly points out the part where the external incisions are to be made; those being completed, it will pierce the urethra in the most proper part instantly and certainly, by which all vague and reiterated incisions will be avoided.—It will render the passage of the gorget above the curvature of the staff unnecessary, direct it into the groove at the beginning of the curve, and then prove an unerring guide for it into the bladder.

der.—Taking all these circumstances into consideration, and recollecting the operation as it has been usually performed, I trust it will appear that the double staff is adapted to shorten and improve the operation of lithotomy.

POSTSCRIPT.

SINCE the publication of the foregoing Work, I have conceived that the double staff may be considerably improved by making a projection or shoulder in the semicircular upright bar, to prevent the cutting part of the short staff from pressing against the groove of the long staff; and also by adding a spring which falls into a notch of the said bar when the instrument is closed. By these means the staves are kept firmly together till the operator chooses to separate them, and his attention

is consequently more at liberty to be applied to other parts of the operation. Vide Plate, fig. 2.

The instrument thus constructed, and with an open groove adapted to receive the beak of any gorget which the operator may choose, is well executed by that ingenious artist Mr. Savigny, in King-street, Covent-garden.

F I N I S.

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